

# Rainbow-G7D

## Generic Q7 Carrier Card Hardware User Guide



## Document Revision History

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## Table of Contents

<b>1. INTRODUCTION .....</b>	<b>8</b>
1.1 PURPOSE .....	8
1.2 QSEVEN OVERVIEW .....	8
1.3 Q7 GENERIC CARRIER CARD FEATURES .....	8
1.4 Q7 GENERIC CARRIER CARD KIT ACCESSORIES .....	11
1.5 LIST OF ACRONYMS .....	11
<b>2. Q7 GENERIC CARRIER CARD AND DESIGN.....</b>	<b>13</b>
2.1 Q7 GENERIC CARRIER CARD BLOCK DIAGRAM .....	13
2.2 QSEVEN MXM CONNECTOR .....	14
2.2.1 Mechanical Dimensions of Qseven CPU Module.....	14
2.2.2 MXM Connector Pin Out.....	15
2.3 SD/MMC CARD SLOT .....	19
2.4 DEBUG CONNECTORS.....	20
2.4.1 9-Pin D-Sub Debug UART .....	20
2.4.2 JTAG Connector.....	22
2.5 GIGABIT ETHERNET & USB HOST0 & 2 INTERFACE .....	24
2.6 USB Host4.....	25
2.7 USB OTG .....	26
2.8 SATA0 INTERFACE .....	28
2.9 SATA1 INTRAFCE.....	29
2.10 CAN0 INTERFACE .....	30
2.11 HDMI INTERFACE .....	31
2.12 AC'97 INTERFACE .....	32
2.13 PCIe0 INTERFACE.....	34
2.14 MINI PCIe SLOT .....	36
2.15 DISPLAY LVDS INTERFACE .....	39
2.16 7`` RESISTIVE TOUCH LCD INTERFACE.....	43
2.17 7`` CAPACITIVE TOUCH LCD INTERFACE (OPTIONAL).....	45
2.18 SDIO Wi-Fi (OPTIONAL).....	48
2.19 SPI HEADER.....	49
2.20 RTC BATTERY.....	50
2.21 ADDITIONAL FEATURES FROM EXPANSION CONNECTORS .....	51
2.21.1 VGA Connector (Optional) .....	51
2.21.2 TV-In Interface .....	52
2.21.3 Camera Interface .....	53
2.21.4 TV-Out Interface (Optional) .....	55

2.21.5	Secondary CAN (Optional) .....	56
2.21.6	Secondary UART.....	57
2.21.7	Keypad interface .....	58
2.22	EXPANSION CONNECTORS .....	59
2.23	POWER SUPPLY.....	65
2.23.1	Power Jack .....	65
<b>3.</b>	<b>MECHANICAL DETAILS.....</b>	<b>67</b>
<b>4.</b>	<b>REFERENCE .....</b>	<b>68</b>
<b>5.</b>	<b>TECHNICAL SUPPORT .....</b>	<b>69</b>

## Table of Figures

FIGURE 1: Q7 GENERIC CARRIER CARD BLOCK DIAGRAM.....	13
FIGURE 2: MECHANICAL SPEC OF QSEVEN CPU MODULE .....	15
FIGURE 3: SD/MMC CARD SLOT .....	19
FIGURE 4: SD/MMC CONNECTOR PIN OUT .....	20
FIGURE 5: DEBUG PORT SELECTION.....	20
FIGURE 6: UART (DB9) CONNECTOR.....	21
FIGURE 7: PIN D-SUB DEBUG UART CONNECTOR PIN OUT.....	22
FIGURE 8: JTAG CONNECTOR .....	23
FIGURE 9: JTAG CONNECTOR PIN OUT.....	23
FIGURE 10: RJ45 (GBE) & USB HOST0 & HOST2 CONNECTOR .....	24
FIGURE 11: RJ45 MAGJACK WITH DUAL USB TYPE-A CONNECTOR PIN OUT.....	25
FIGURE 12: USB HOST4 CONNECTORS .....	26
FIGURE 13: USB HOST4 CONNECTOR PIN OUT .....	26
FIGURE 14: USB1 OTG CONNECTOR .....	27
FIGURE 15: USB1 OTG CONNECTOR PIN OUT .....	27
FIGURE 16: SATA0 22PIN CONNECTOR.....	28
FIGURE 17: SATA0 22PIN CONNECTOR PIN OUT .....	29
FIGURE 18: SATA1 7PIN CONNECTOR.....	29
FIGURE 19: SATA1 7PIN CONNECTOR PIN OUT .....	30
FIGURE 20: CAN 9-PIN D-SUB CONNECTOR .....	30
FIGURE 21: CAN 9-PIN D-SUB CONNECTOR PIN OUT .....	30
FIGURE 22: HDMI PORT.....	31
FIGURE 23: HDMI PORT PIN OUT .....	32
FIGURE 24: AUDIO JACK.....	33
FIGURE 25: AUDIO OUT JACK PIN OUT .....	33
FIGURE 26: MIC IN JACK PIN OUT .....	34
FIGURE 27: PCIe0 X1 SLOT .....	34
FIGURE 28: PCIe0 X1 SLOT PIN OUT .....	36
FIGURE 29: MINI PCIe SLOT .....	36
FIGURE 30: MINI PCIe SLOT PIN OUT .....	38
FIGURE 31: SIM SLOT PIN OUT.....	39
FIGURE 32: LVDS0 CONNECTORS.....	39
FIGURE 33: LVDS0 CONNECTOR PIN OUT.....	40
FIGURE 34: LVDS0 BACKLIGHT CONNECTOR PIN OUT .....	40
FIGURE 35: LVDS1 CONNECTORS.....	41
FIGURE 36: LVDS1 CONNECTOR PIN OUT.....	42
FIGURE 37: LVDS1 BACKLIGHT CONNECTOR PIN OUT.....	42
FIGURE 38: 7`` RESISTIVE LCD CONNECTOR .....	43

FIGURE 39: 7`` RESISTIVE LCD CONNECTOR PIN OUT .....	44
FIGURE 40: RESISTIVE TOUCH CONNECTOR PIN OUT .....	45
FIGURE 41: 7`` CAPACITIVE TOUCH LCD CONNECTOR .....	45
FIGURE 42: 7`` CAPACITIVE TOUCH LCD CONNECTOR PIN OUT .....	47
FIGURE 43: CAPACITIVE TOUCH CONNECTOR PIN OUT .....	47
FIGURE 44: SDIO WI-FI MODULE CONNECTOR .....	48
FIGURE 45: SDIO WI-FI MODULE CONNECTOR PIN OUT .....	49
FIGURE 46: SPI CONNECTOR .....	50
FIGURE 47: SPI CONNECTOR PIN OUT .....	50
FIGURE 48: 15-PIN D-SUB VGA CONNECTOR .....	51
FIGURE 49: 15-PIN D-SUB VGA CONNECTOR PIN OUT .....	52
FIGURE 50: TV-IN CONNECTOR .....	53
FIGURE 51: TV-IN CONNECTOR PIN OUT .....	53
FIGURE 52: CAMERA CONNECTOR .....	54
FIGURE 53: CAMERA CONNECTOR PIN OUT .....	55
FIGURE 54: TV-OUT CONNECTOR .....	55
FIGURE 55: TV-OUT CONNECTOR PIN OUT .....	56
FIGURE 56: SECONDARY CAN CONNECTOR .....	56
FIGURE 57: SECONDARY CAN CONNECTOR PIN OUT .....	56
FIGURE 58: SECONDARY UART CONNECTOR .....	57
FIGURE 59: SECONDARY UART CONNECTOR PIN OUT .....	57
FIGURE 60: KEYPAD CONNECTOR .....	58
FIGURE 61: KEYPAD CONNECTOR PIN OUT .....	58
FIGURE 62: EXPANSION CONNECTOR1 PIN OUT .....	61
FIGURE 63: EXPANSION CONNECTOR2 PIN OUT .....	64
FIGURE 64: POWER IN CIRCUIT .....	66
FIGURE 65: POWER JACK .....	66
FIGURE 66: POWER JACK PIN OUT .....	66
FIGURE 67: Q7 GENERIC CARRIER CARD PCB DIMENSION .....	67

## List of Tables

TABLE 1: ACRONYMS & ABBREVIATIONS .....	11
TABLE 2: MXM CONNECTOR .....	14
TABLE 3: MXM CONNECTOR PIN OUT.....	15
TABLE 4: USB OTG ID SELECTION .....	27
TABLE 5: EXPANSION CONNECTOR1 PIN OUT.....	59
TABLE 6: EXPANSION CONNECTOR2 PIN OUT.....	62
TABLE 7: POWER SEQUENCE TABLE .....	65

## 1. INTRODUCTION

### 1.1 Purpose

This document is the Hardware Reference Manual for the Q7 Generic Carrier Card. This board is fully supported by iWave Systems Technologies Pvt. Ltd. This Manual includes system setup, debugging and provides detailed information on the overall design and usage of the Q7 Generic Carrier Card from a Hardware Systems perspective.

### 1.2 Qseven Overview

The Qseven concept is an off-the-shelf, multi vendor, Single-Board-Computer that integrates all the core components of a common PC and is mounted onto an application specific carrier board. Qseven modules have a standardized form factor of 70mm x 70mm and have specified pinouts based on the high speed MXM system connector that has a standardized pinout regardless of the vendor. The Qseven module provides the functional requirements for an embedded application. These functions include, but are not limited to, graphics, sound, mass storage, network and multiple USB ports. A single ruggedized MXM connector provides the carrier board interface to carry all the I/O signals to and from the Qseven module. This MXM connector is a well known and proven high speed signal interface connector that is commonly used for high speed PCI Express graphics cards in notebooks.

iWave Q7 carrier card incorporated with additional two 80pin expansion connectors to bring the non standard Qseven interfaces to carrier card associated with iWave's Qseven CPU modules.

### 1.3 Q7 Generic Carrier Card Features

#### Qseven Standard features

- Secure Digital I/O interface
  - 8bit MMC/SDIO Connector
- Debug Connectors
  - 9-Pin D-Sub Debug UART Connector
  - 10-Pin JTAG Connector
- Gigabit Ethernet
  - RJ45MagJack for 10/100/1000 Mbps Ethernet
- USB 2.0
  - HS USB 2.0 Standard-A Host Connector x3
  - HS USB 2.0 Micro USB OTG Connector



- Serial ATA
  - 22pin SATA Connector for SATA port0
  - 7pin SATA Connector for SATA port1
- CAN
  - 9-Pin D-Sub Connector
- TMDS
  - Standard HDMI port
- AC'97 Audio
  - 3.5mm Stereo Head Phone output
  - 3.5mm Mono-Microphone input
- PCIeExpress
  - 1X PCIe slot/Mini PCIe Connector
- Mini PCIe connector
  - 52-Pin mini PCIe connector with USB Interface (USB Port3). SIM slot provided to support 3G modules
- LVDS Display Interface
  - 20pin Primary LVDS connector with 2-pin 15V output backlight connector
  - 20pin Secondary LVDS connector with 2-pin 15V output backlight connector
- RGB Display Interface from primary LVDS signals
  - 7" RGB-18bit Resistive Touch LCD interface
  - 7" RGB-24bit Capacitive Touch LCD interface(optional)
- SDIO Wi-Fi (optional)
  - On board Taiyo Yuden SDIO OEM Wi-Fi module "WYSAAVDX7"
- Miscellaneous
  - 3V, Coin cell for RTC
  - Reset Button
  - Power On Button
  - SPI header

### **Additional Features from expansion connectors**

- VGA Output (optional)

- 15-Pin D-Sub VGA Connector
- TV-In interface
  - Standard RCA Connector
- CMOS Camera Interface
  - 8bit CMOS camera
- TV-Out interface
  - Standard RCA Connector
- Secondary CAN (optional)
  - 3-pin header
- Secondary UART
  - 5-pin header
- 4X4 Keypad connector
  - 10-pin header

### Others

- Future Expansion Header (optional)
  - 120-Pin Expansion Header
- Power Supply
  - 12V, 3A Adapter Jack
- Indicators
  - Red LED for Power Indication
  - RED Reset Indicator LED
- Temperature Supported
  - - 0°C to +70°C Commercial grade
- PCB
  - Nano-ITX- 120 mm × 120 mm (4.7 in × 4.7 in)

**Note:** All Optional Features will not be supported in default configuration. Please contact iWave for optional features support.

## 1.4 Q7 Generic Carrier Card kit accessories

Q7 Generic Carrier Card comes with the following accessories:

- Q7 Generic Carrier Card
- RS-232 Serial Cable
- 12V,2A Power Adapter

## 1.5 List of Acronyms

The following acronyms will be used throughout this document.

**Table 1: Acronyms & Abbreviations**

Acronyms	Description
ARM	Advanced RISC Machine
BPP	Bits Per Pixel
eCSPI	Enhanced Configurable Serial Peripheral Interface
GB	Giga Byte
GPIO	General Purpose Input Output
I2C	Inter-Integrated Circuit
IC	Integrated Circuit
JTAG	Joint Test Action Group
KB	Kilo Byte
LCD	Liquid Crystal Display
LDO	Low Drop-Out
MB	Mega Byte
Mbps	Mega bits per sec
MHz	Mega Hertz
MMC	Multi Media Card
ms	Milli Second
MSPS	Milli Second Per Sample
PCB	Printed Circuit board
PUMS	Power Up Mode Supply
PWM	Pulse Width Modulation
RGB	Red Green Blue
RMII	Reduced Media Independent Interface
ROHS	Restriction of Hazardous Substances

RTC	Real Time Clock
SD	Secure Digital
SDIO	Secure Digital Input Output
SPI	Serial Peripheral Interface
SSI	Synchronous Serial Interface
UART	Universal Asynchronous Receiver/Transmitters
USB	Universal Serial bus
V	Voltage
VGA	Video Graphics Array
GBE	Gigabit Ethernet

## 2. Q7 Generic Carrier Card and Design

This section is designed to provide the developer detailed information about the electrical design and practical considerations that went into the Q7 Generic Carrier Card. This section is organized to discuss each block in the following high level block diagram, as shown in Figure 1.

### 2.1 Q7 Generic Carrier Card Block Diagram

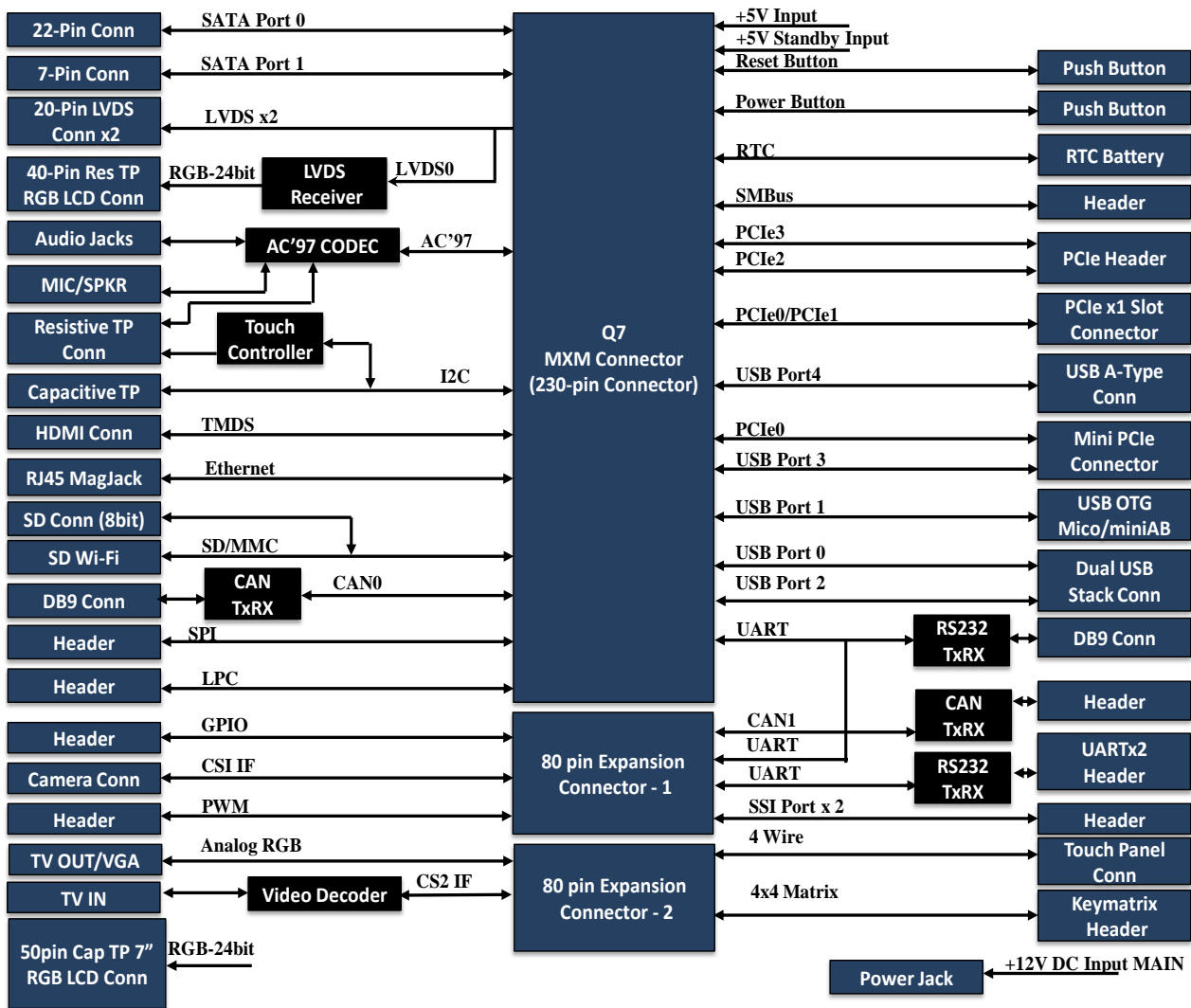


Figure 1: Q7 Generic Carrier Card Block Diagram

## 2.2 Qseven MXM Connector

The Qseven module utilizes a 230-pin card-edge connector that is also used for PCI Express capable notebook graphics cards following the MXM specification. Therefore, this connector type is also known as a MXM connector.

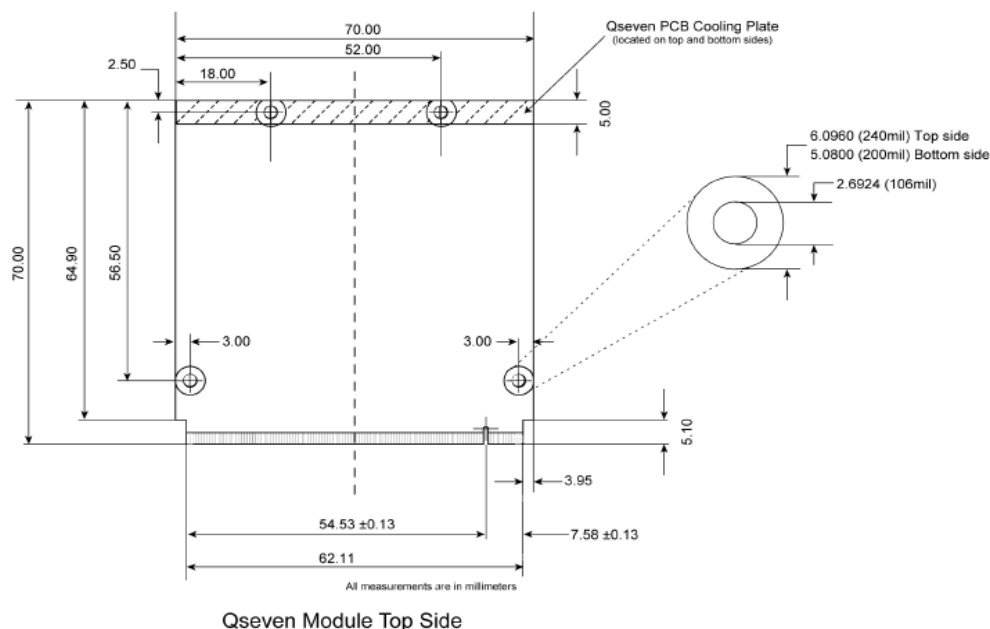
The MXM edge connector is the result of an extensive collaborative design effort with the industry's leading notebook manufacturers. This collaboration has produced a robust, low-cost edge connector that is capable of handling high-speed serialized signals.

### Table 2: MXM Connector

Manufacturer	Part Number	Specification	Resulting height between carrier board and Qseven module	Overall height of the MXM Connector
Foxconn	AS0B326-S78N-7F	AS0B326-S78N-7F	5.0mm	7.8mm
Aces	88882-2D0K	88882-2Dxx	5.0mm	7.5mm

### 2.2.1 Mechanical Dimensions of Qseven CPU Module

Below figures shows the mechanical spec of CPU modules. For more information refer Qseven spec 1.20 “**Qseven-Spec 1.20.pdf**”



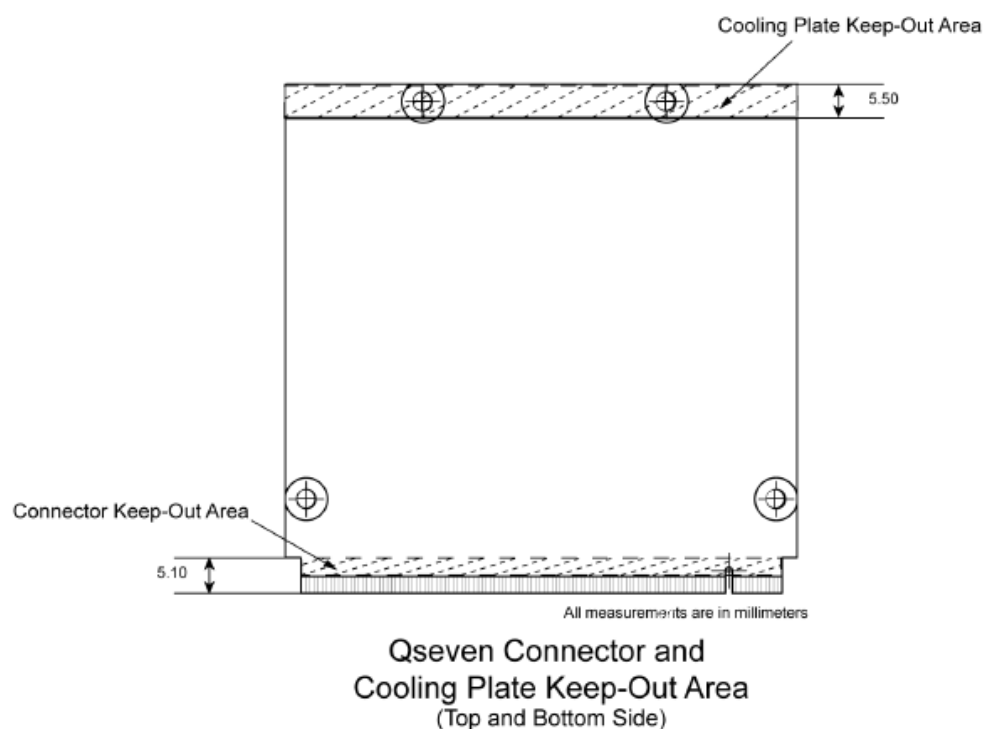


Figure 2: Mechanical spec of Qseven CPU Module

## 2.2.2 MXM Connector Pin Out

Below tables shows the MXM connector Pin Out of Q7 Generic Carrier Card

Table 3: MXM Connector Pin Out

PIN NO	SIGNAL NAME	PIN NO	SIGNAL NAME
1	GND	2	GND
3	GBE_MDI3-	4	GBE_MDI2-
5	GBE_MDI3+	6	GBE_MDI2+
7	LINK 100#	8	GBE_LINK 1000# *
9	ETH_TXN_GBE_MDI1-	10	ETH_RXN_GBE_MDI0-
11	ETH_TXP_GBE_MDI1+	12	ETH_RXP_GBE_MDI0+
13	ETH_LINK#	14	ETH_ACT#
15	ETH_CTREF *	16	SUS_S5# *
17	NC	18	SUS_S3# *
19	NC	20	PWRBTN#
21	NC	22	NC
23	GND	24	GND

## Generic Q7 Carrier Card Hardware User Guide

25	GND	26	PWGIN *
27	NC	28	RSTBTN#
29	SATA0_TX+	30	SATA1_TX+
31	SATA0_TX-	32	SATA1_TX-
33	SATA_ACT#	34	GND
35	SATA0_RX+	36	SATA1_RX+
37	SATA0_RX-	38	SATA1_RX-
39	GND	40	GND
41	NC	42	SDIO_CLK
43	SDIO_CD#	44	SDIO_LED
45	SDIO_CMD	46	SDIO_WP
47	SDIO_PWR# *	48	SDIO_DAT1
49	SDIO_DAT0	50	SDIO_DAT3
51	SDIO_DAT2	52	SDIO_DAT5
53	SDIO_DAT4	54	SDIO_DAT7
55	SDIO_DAT6	56	NC
57	GND	58	GND
59	AC_SYNC	60	NC
61	AC_RST#	62	NC
63	AC_BITCLK	64	NC
65	AC_SDI	66	I2C_CLK
67	AC_SDO	68	I2C_DAT
69	NC	70	NC
71	NC	72	NC
73	GND	74	GND
75	NC	76	NC
77	NC	78	NC
79	NC	80	USB
81	NC	82	USB_P4-
83	NC	84	USB_P4+
85	USB_2_3_OC#	86	USB_0_1_OC#
87	USB_P3-	88	USB_P2-
89	USB_P3+	90	USB_P2+
91	USB_CC	92	USB_ID
93	USB_P1HC-	94	USB_P0-
95	USB_P1HC+	96	USB_P0+
97	GND	98	GND



## Generic Q7 Carrier Card Hardware User Guide

99	LVDS_A0+	100	LVDS_B0+
101	LVDS_A0-	102	LVDS_B0-
103	LVDS_A1+	104	LVDS_B1+
105	LVDS_A1-	106	LVDS_B1-
107	LVDS_A2+	108	LVDS_B2+
109	LVDS_A2-	110	LVDS_B2-
111	LVDS_PPEN	112	LVDS_BLEN
113	LVDS_A3+	114	LVDS_B3+
115	LVDS_A3-	116	LVDS_B3-
117	GND	118	GND
119	LVDS_A_CLK+	120	LVDS_B_CLK+
121	LVDS_A_CLK-	122	LVDS_B_CLK-
123	LVDS_BLT_CTRL_GP_PWM_OUT0	124	RSVD2
125	LVDS_DID_DAT_GP_I2C_DAT	126	LVDS_BLC_DAT
127	LVDS_DID_CLK_GP_I2C_CLK	128	LVDS_BLC_CLK
129	CAN0_TXD	130	CAN0_RXD
131	TMDS_CLK+_SDVO_BCLK+	132	NC
133	TMDS_CLK-_SDVO_BCLK-	134	NC
135	GND	136	GND
137	TMDS_LANE1+_SDVO_GREEN+	138	NC
139	TMDS_LANE1-_SDVO_GREEN-	140	NC
141	GND	142	GND
143	TMDS_LANE0+_SDVO_BLUE+	144	NC
145	TMDS_LANE0-_SDVO_BLUE-	146	NC
147	GND	148	GND
149	TMDS_LANE2+_SDVO_RED+	150	HDMI_SDVO_CTL_DAT
151	TMDS_LANE2-_SDVO_RED-	152	HDMI_SDVO_CTL_CLK
153	HDMI_HPD#	154	NC
155	PCIe_CLK_REF+	156	PCIe_WAKE#
157	PCIe_CLK_REF-	158	NC
159	GND	160	GND
161	NC	162	NC
163	NC	164	NC
165	GND	166	GND
167	NC	168	NC
169	NC	170	NC
171	NC	172	NC

## Generic Q7 Carrier Card Hardware User Guide

173	PCIE1_TX+	174	PCIE1_RX+
175	PCIE1_TX-	176	PCIE1_RX-
177	NC	178	NC
179	PCIE0_TX-	180	PCIE0_RX+
181	PCIE0_TX-	182	PCIE0_RX-
183	GND	184	GND
185	NC	186	NC
187	NC	188	NC
189	NC	190	NC
191	NC	192	NC
193	VCC_RTC	194	GP_PWM_OUT2 (Connected to Secondary LVDS Backlight Control) *
195	NC	196	NC
197	GND	198	GND
199	SPI_MOSI	200	SPI_CS0#
201	SPI_MISO	202	SPI_CS1#
203	SPI_SCK	204	MFG4_JTAG_TRST#
205	VCC_5VA	206	VCC_5VA
207	MFG0_JTAG_TCK	208	MFG2_JTAG_TDI
209	MFG1_JTAG_TDO	210	MFG3_JTAG_TMS
211	VCC_5V_CPU	212	VCC_5V_CPU
213	VCC_5V_CPU	214	VCC_5V_CPU
215	VCC_5V_CPU	216	VCC_5V_CPU
217	VCC_5V_CPU	218	VCC_5V_CPU
219	VCC_5V_CPU	220	VCC_5V_CPU
221	VCC_5V_CPU	222	VCC_5V_CPU
223	VCC_5V_CPU	224	VCC_5V_CPU
225	VCC_5V_CPU	226	VCC_5V_CPU
227	VCC_5V_CPU	228	VCC_5V_CPU
229	VCC_5V_CPU	230	VCC_5V_CPU

Note \*: Denotes Optional features, not supported in default configuration.

## 2.3 SD/MMC Card Slot

The SD/MMC Card Connector (J5) is connected to the Secure Digital I/O interface of the MXM connector. This card socket will support up to a 8-bit data transfer. It supports card detect feature, by default card detect pin is high after inserting card to the socket this pin should go low for proper card detection. The main power for the Card Socket is 3.3V. The SD Card slot can be configured as SD or MMC card operation. The SD Card Slot supports full 8-bit parallel data transfers and can support SDIO cards (Wi-Fi, BT, etc) designed to fit in a standard SD card slot. SD/MMC slot is physically located on top of the board.

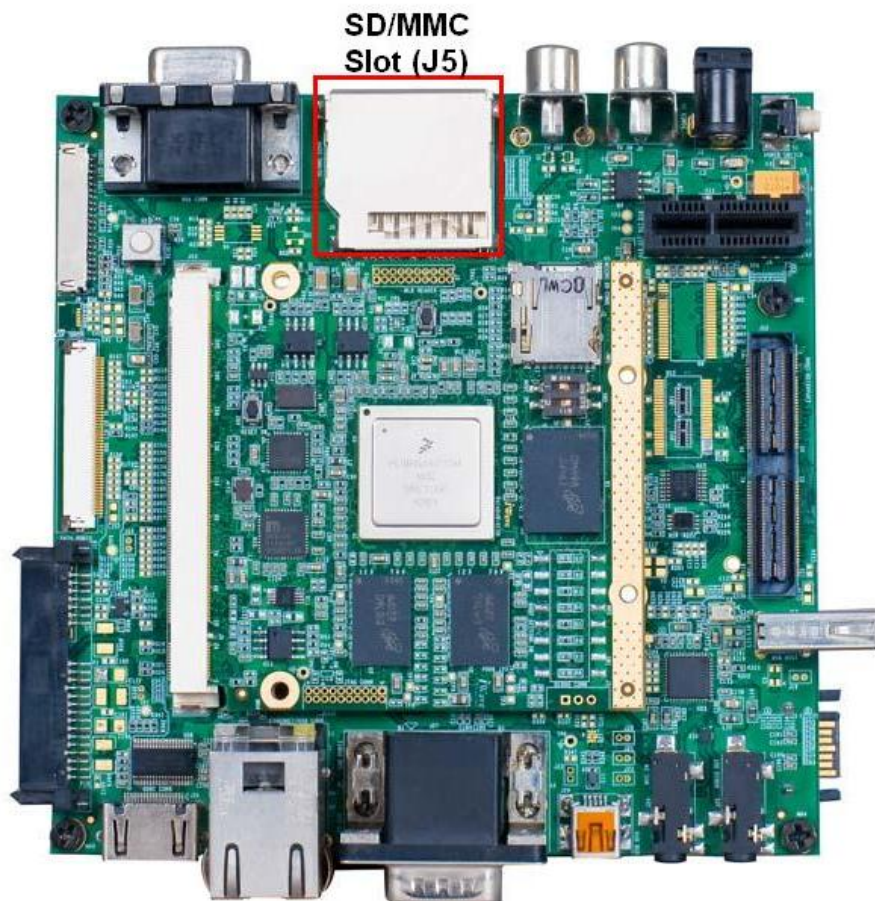


Figure 3: SD/MMC Card Slot

Pin No	Pin Details	Description
1	SDIO _WP	Write Protect
2	SDIO _CD#	Card Detect Signal
3	SDIO_DAT1	Data Line (bit1)
4	SDIO_DAT0	Data Line (bit0)
5	SDIO_DAT7	Data Line (bit7)
6	GND	Ground
7	SDIO_DAT6	Data Line (bit6)
8	SDIO_CLK	Clock
9	SD_3V3	Supply Voltage
10	VSS	Ground
11	SDIO_DAT5	Data Line (bit5)
12	SDIO_CMD	Command Response
13	SDIO_DAT4	Data Line (bit4)
14	SDIO_DAT3	Data Line (bit3)
15	SDIO_DAT2	Data Line (bit2)

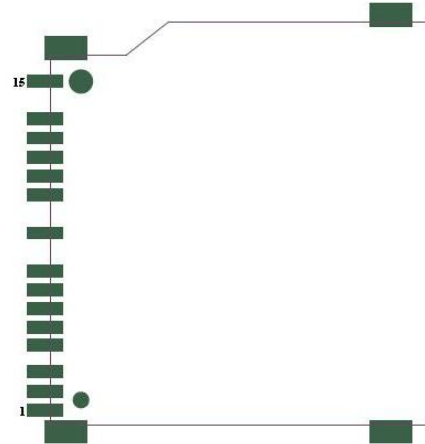


Figure 4: SD/MMC Connector Pin Out

## 2.4 Debug Connectors

Q7 Generic Carrier Card provides a 9-Pin D-Sub Debug UART Connector and JTAG connector for debugging. Both debug interfaces are sharing same signals from MXM connector, since MUX select line is used to select either UART or JTAG. Q7 Generic Carrier Card provided jumper option (J62) to select Debug ports. For further information on these signals refer section “Manufacturing Signals” of Qseven spec R1.20. In default jumper will be open and UART will be supported.

J62 Jumper Position	Debug Port
Open	UART Port
Close	JTAG Port

Figure 5: Debug port selection

### 2.4.1 9-Pin D-Sub Debug UART

UART will be used for Debug purpose. This is not the full functional UART and supports only Serial TX and RX signals. External RS232 Transceiver will be used to convert the Processor CMOS UART Transmit signal into RS232 signals at the driver section and convert the RS232 receive signals into CMOS signals at the Receiver section. This RS232 signals will be connected to 9-Pin

D-Sub Debug UART Connector which is physically located on top of the board for external debug access.

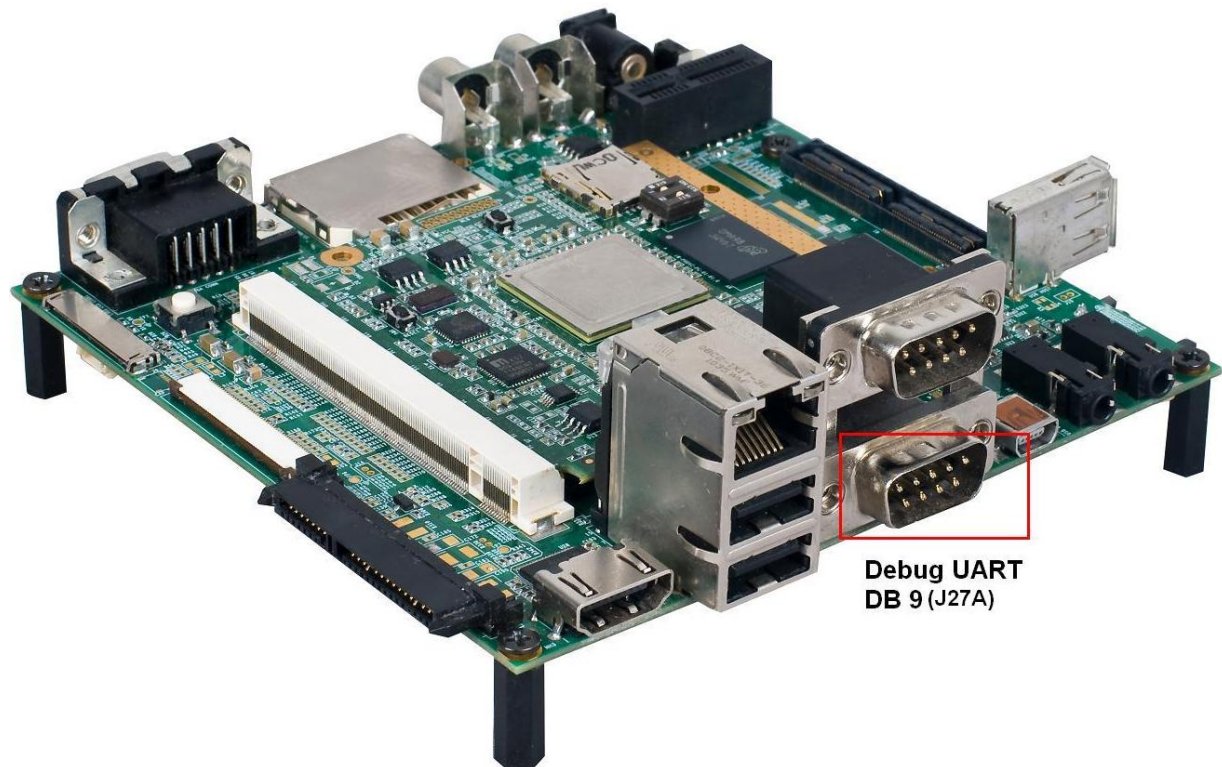


Figure 6: UART (DB9) Connector

Pin No	Pin Details	Description
A1	NC	No Connection
A2	MFG2_JTAG_TDI	Receive Data to CPU
A3	MFG1_JATG_TDO	Transmit Data from CPU
A4	NC	Data Transmit Ready
A5	GND	Ground
A6	NC	Data Set Ready
A7	NC	Request to Send
A8	NC	Clear to Send
A9	NC	No Connection
M1,M2, M3,M4	DSUB_SHLD_GND	Shield Ground

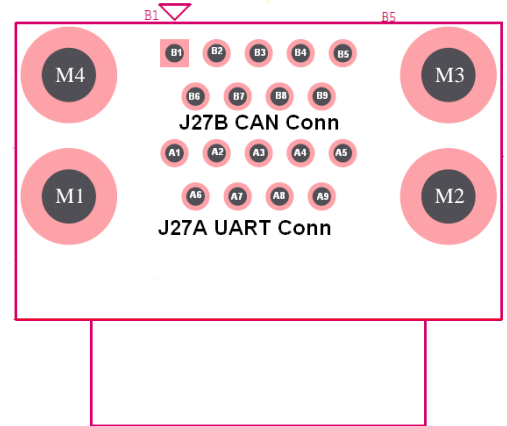


Figure 7: Pin D-Sub Debug UART Connector Pin Out

## 2.4.2 JTAG Connector

A 10-pin JTAG connector is provided on the Q7 Generic Carrier Card. Logic signals to the JTAG connector are depends on the Qseven CPU manufactures. JTAG connector is physically located on bottom of the board.



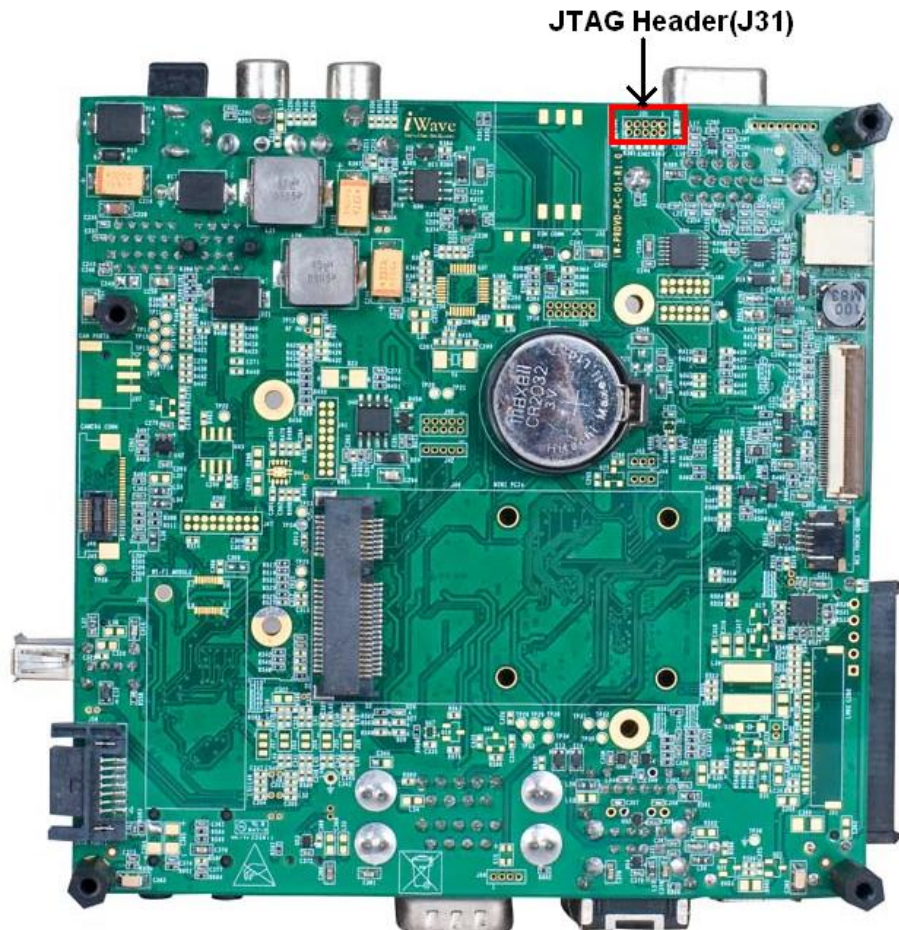


Figure 8: JTAG Connector

Pin No	Pin Details	Description
1	VCC_3V3	Supply Voltage
2	GND	Ground
3	VCC_3V3	Supply Voltage
4	MFG4_JTAG_TRST#	Test Reset Signal
5	MFG0_JTAG_TCK	Test Clock
6	MFG2_JTAG_TDI	Test Data Input
7	MFG1_JATG_TDO	Test Data Output
8	MFG3_JTAG_TMS	Test Mode Select
9	GND	Supply Voltage
10	GND	Ground

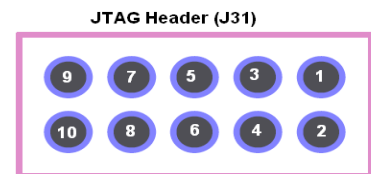


Figure 9: JTAG Connector Pin Out

## 2.5 Gigabit Ethernet & USB HOST0 & 2 Interface

Ethernet, USB Host0 & 2 interfaces are shared stacked connector. GBE signals from MXM connector is connected to RJ45 magnetic connector (top), with LED indicators. RJ45 Ethernet connector is physically located on top of the board. Similarly USB HOST0 & USB HOST2 interfaces from MXM connector are connected to bottom and middle port respectively. GBE connector will work for both 10/100 & 10/100/1000 Mbps Ethernet operation.

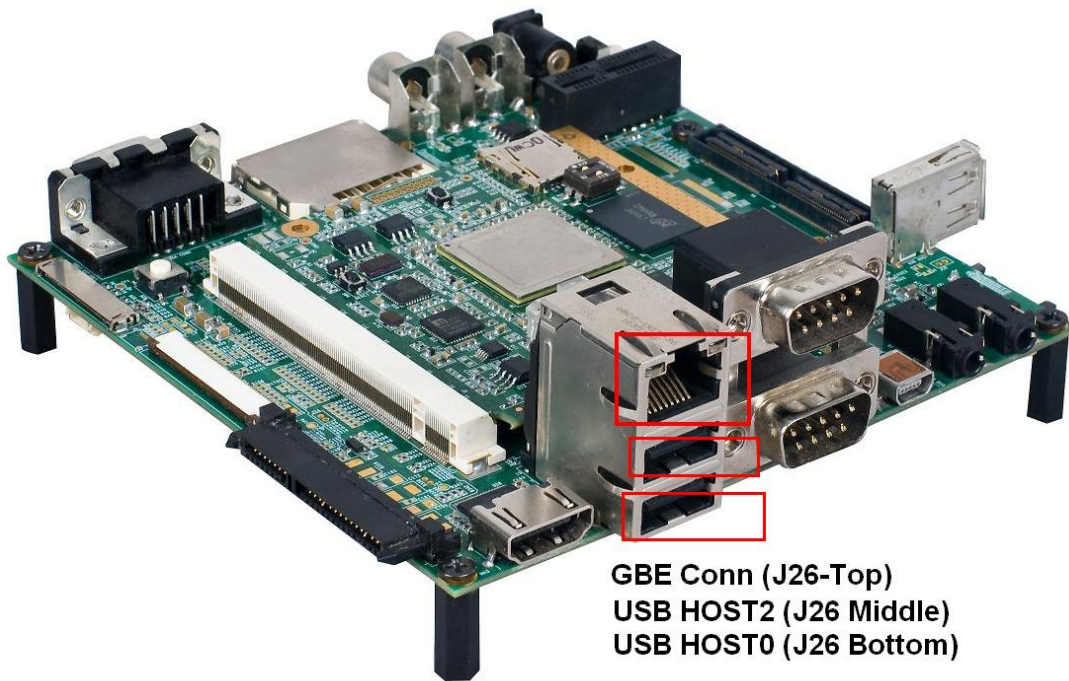
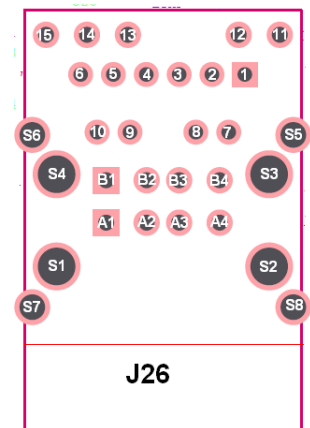


Figure 10: RJ45 (GBE) & USB Host0 & Host2 Connector

Pin No	Pin Details	Description
1	GND	Ground
2	ETH_RXP_GBE_MDIO+	Media Dependent Interface (MDI) differential pair 0
3	ETH_RXN_GBE_MDIO-	
4	ETH_TXP_GBE_MDIO1+	Media Dependent Interface (MDI) differential pair 1
5	ETH_TXN_GBE_MDIO1-	
6	RCT	Ref Voltage(VCC_3V3)
7	GBE_MDI2+	Media Dependent Interface (MDI) differential pair 2
8	GBE_MDI2-	
9	GBE_MDI3+	Media Dependent Interface (MDI) differential pair 3
10	GBE_MDI3-	





11	LINK_100#	LED1 Cathode
12	VCC_3V3	LED1 Anode
13	ETH_LINK#	LED1 Cathode
14	VCC_3V3	LED1 Anode
S5,S6,S7,S8	Shield Ground	Shield Ground Ethernet
15	ETH_ACT#	LED1 Cathode
A1	USB_VBUS0	USB0 5V Power (Bottom)
A2	USB_P0-	USB0 Data negative (Bottom)
A3	USB_P0+	USB0 Data Positive(Bottom)
A4	Ground	USB0 Ground (Bottom)
S1,S2	Shield Ground	Shield Ground (Bottom)
B1	USB_VBUS2	USB2 5V Power (Top)
B2	USB_P2-	USB2 Data negative (Top)
B3	USB_P2+	USB2 Data Positive (Top)
B4	Ground	USB2 Ground (Top)
S3,S4	Shield Ground	Shield Ground USB2 (Top)

Figure 11: RJ45 Magjack with Dual USB Type-A Connector Pin Out

### 2.6 USB Host4

USB Host4 signals from the MXM connector is connected to standard USB Type-A connector. USB Host4 connector is physically located on top of the board.

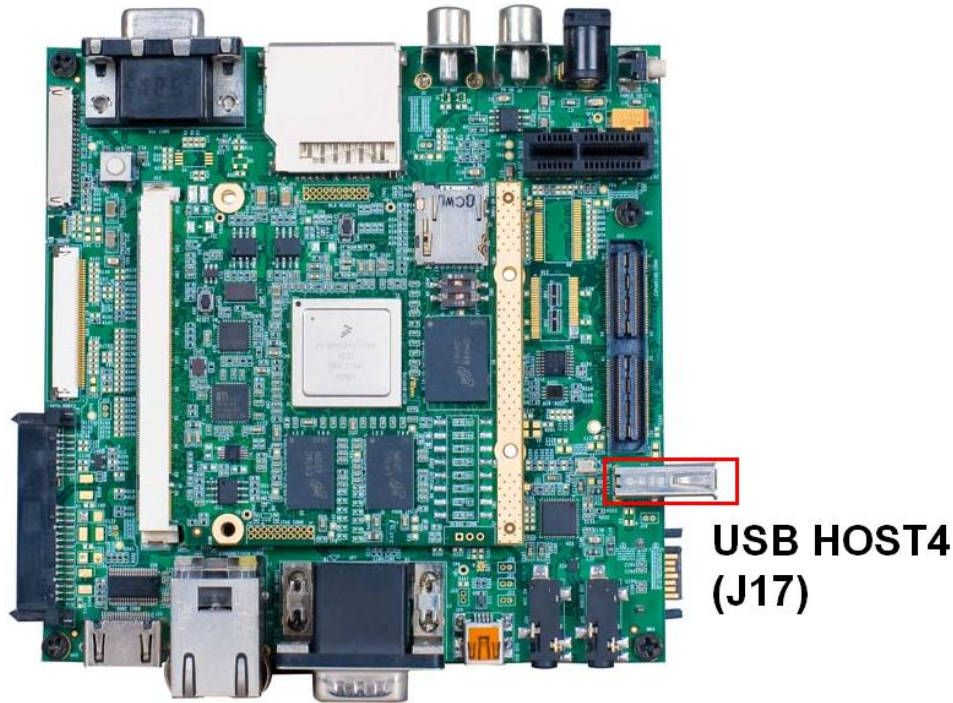


Figure 12: USB Host4 Connectors

Pin No	Pin Details	Description
1	USB_VBUS4	USB4 5V Power
2	USB_P4-	USB4 Data negative
3	USB_P4+	USB4 Data Positive
4	Ground	USB4 Ground
S1,S2,S3,S4	Shield Ground	Shield Ground

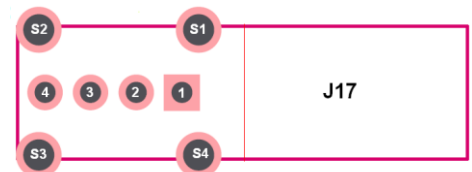


Figure 13: USB Host4 Connector Pin Out

## 2.7 USB OTG

USB port1 OTG signals from MXM connector is connected to USB micro (Optional mini-AB) connector. USB port1 supports OTG full functionality. To support USB OTG full functionality jumper (J22) option is provided for USB-ID pin, either proper Host and Device cable can be used or Jumper can be used to configure the port. USB1 OTG connector is physically located on top of the board.

# Generic Q7 Carrier Card Hardware User Guide

Table 4: USB OTG ID Selection

J22 Jumper Position	USB OTG Functionality
Open	USB Device
Close	USB Host

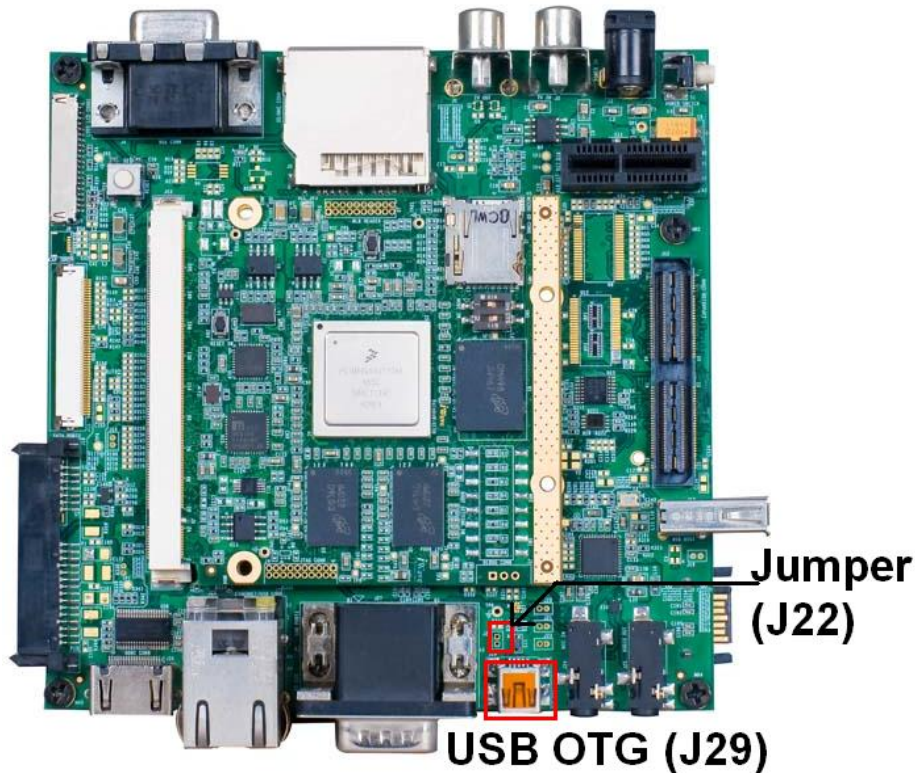


Figure 14: USB1 OTG Connector

Pin No	Pin Details	Description
1	USB_VBUS1	USB1 5V Power
2	USB_P1HC-	USB1 Data negative
3	USB_P1HC+	USB1 Data Positive
4	USB ID	USD ID signal Open(float): Device
5	Ground	USB1 Ground
S1,S2,S3,S4	Shield Ground	Shield Ground

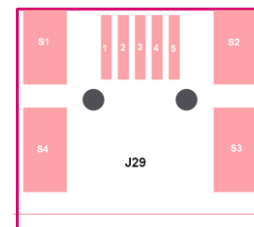


Figure 15: USB1 OTG Connector Pin Out

## 2.8 SATA0 Interface

SATA0 signals from MXM connector are connected to standard 22pin SATA connector with power. 22pin SATA connector is physically located on top of the board.

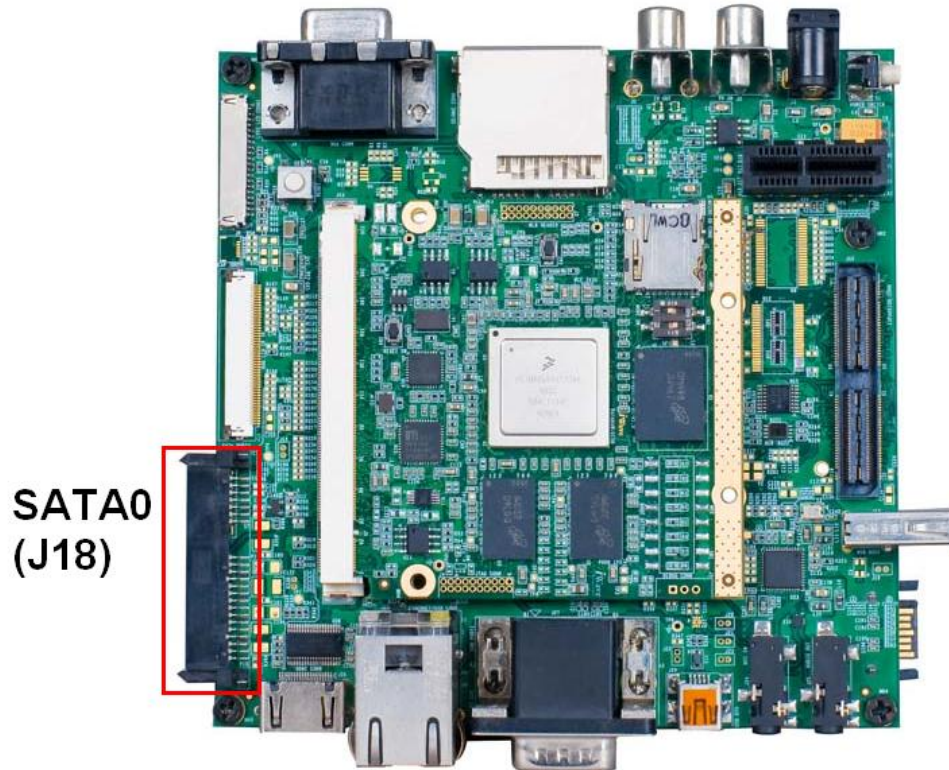
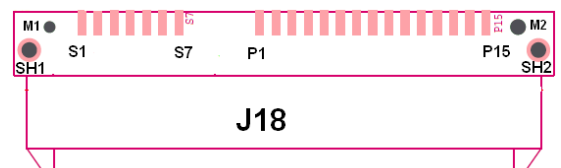


Figure 16: SATA0 22pin Connector

Pin No	Pin Details	Description
S1	GND	Ground
S2	SATA0_TX+	Serial ATA channel0, Receive Input differential pair.
S3	SATA0_TX	
S4	GND	Ground
S5	SATA0_RX	Serial ATA channel0, Transmit Output differential pair.
S6	SATA0_RX+	
s7	GND	Ground
P1,P2,P3	VCC_3V3	3.3V Power Supply(1000mA)
P4,P5,P6	GND	Ground
P7,P8,P9	VCC_5V	5V Power Supply(1000mA)
P10,P11,P12	GND	Ground
P13,P14,P15	VCC_12V	12V Power Supply(350mA)





SH1,SH2	SH_GND	Shield Ground
M1,M2	NC	Mechanical Support

Figure 17: SATA0 22pin Connector Pin Out

## 2.9 SATA1 Intrafce

SATA1 signals from MXM connector are connected to standard 7pin SATA connector without power. 7pin SATA connector is physically located on bottom of the board.

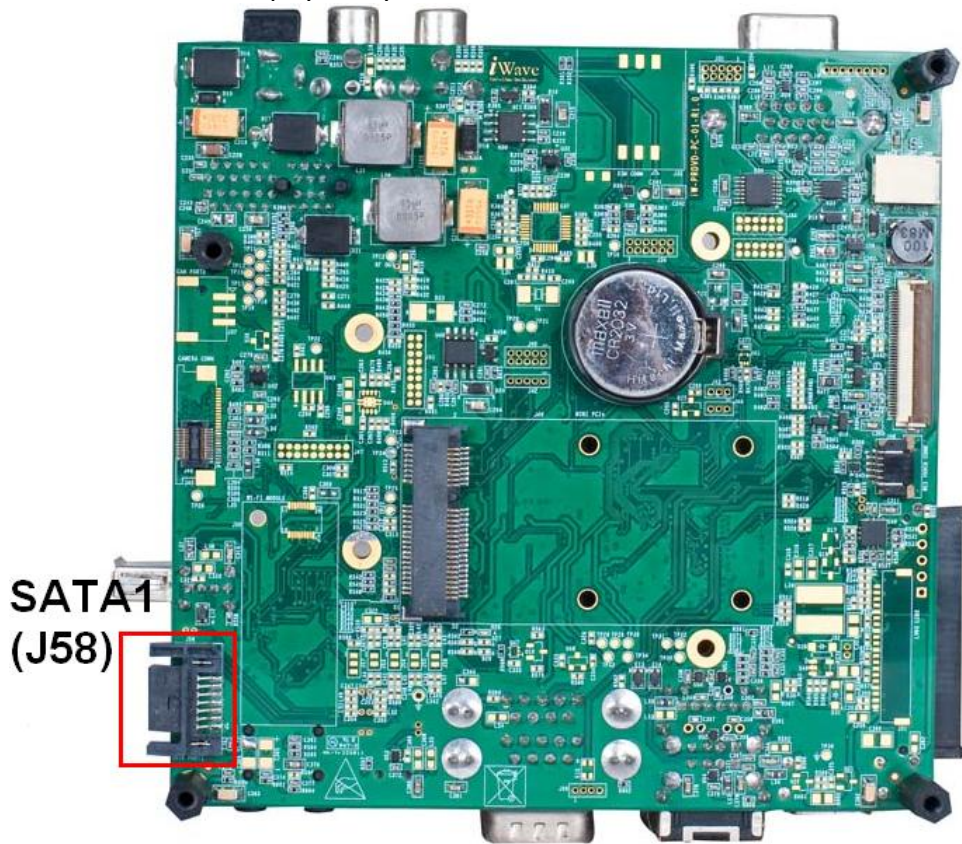
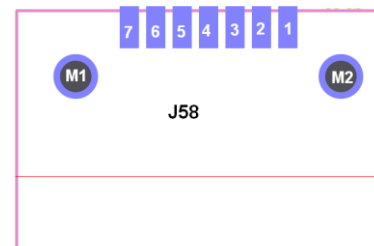


Figure 18: SATA1 7pin Connector

Pin No	Pin Details	Description
1	GND	Ground
2	SATA1_TX+	Serial ATA channel1, Receive Input differential pair.
3	SATA1_TX	
4	GND	Ground
5	SATA1_RX	Serial ATA channel1, Transmit Output differential pair.
6	SATA1_RX+	



7	GND	Ground
M1,M2	NC	Mechanical Support

Figure 19: SATA1 7pin Connector Pin Out

## 2.10 CAN0 Interface

CAN Signals TXD and RXD signals from MXM connector is connected to CAN transceiver and to 9-Pin D-Sub connector. CAN 9-pin D-Sub connector is physically located on top of the board.

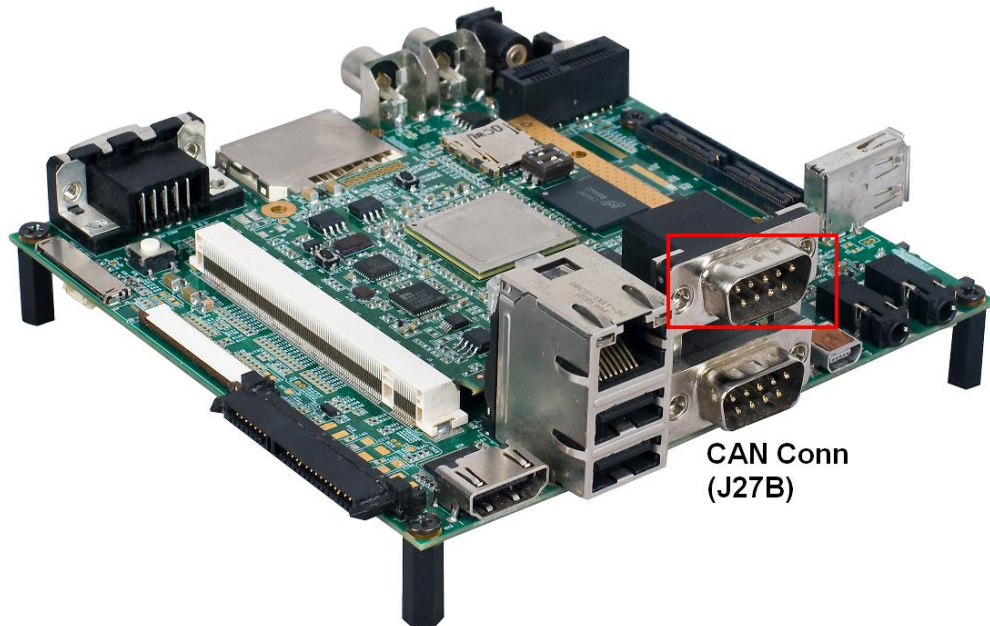


Figure 20: CAN 9-pin D-Sub Connector

Pin No	Pin Details	Description
B1	NC	No Connection
B2	CAN0L	CAN Differential Low Side
B3	GND	Ground
B4	NC	No Connection
B5	CAN_SHLD_GND	CAN Shield Ground
B6	GND	Ground
B7	CAN0H	CAN Differential High Side
B8	NC	No Connection
B9	VCC_12V	12V Power supply
M1,M2, M3,M4	DSUB_SHLD_GND	Shield Ground

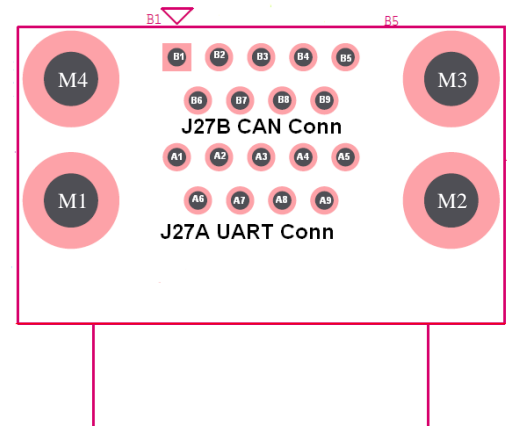


Figure 21: CAN 9-pin D-Sub Connector Pin Out

## 2.11 HDMI Interface

TMDS signals from MXM connector are connected to Standard HDMI port with protection circuitry. HDMI port is physically located on top of the board.

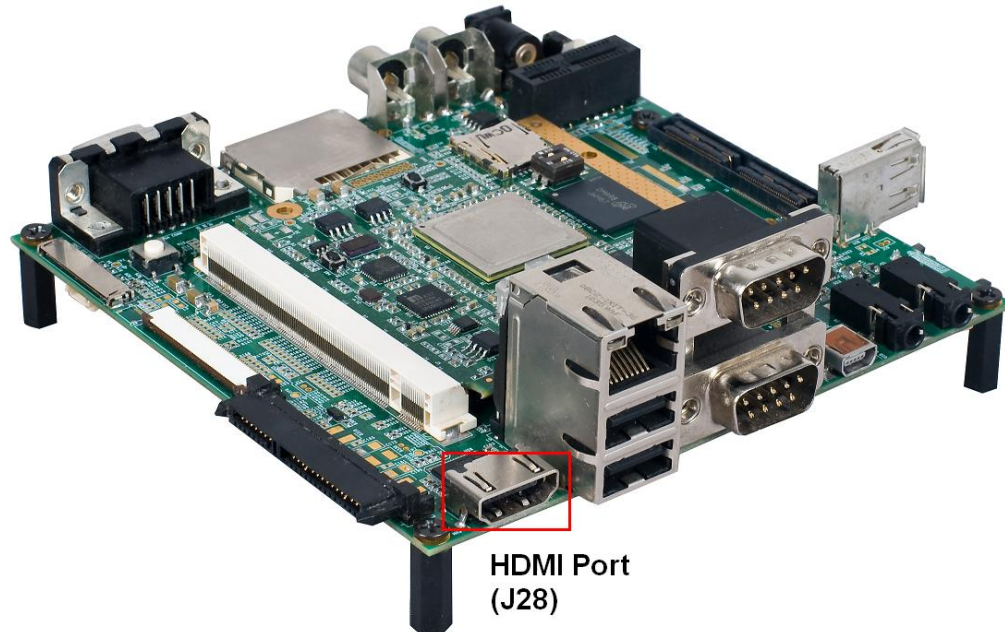
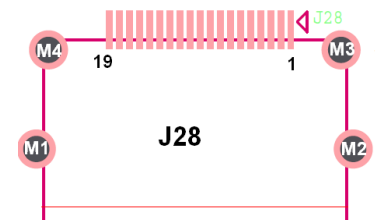


Figure 22: HDMI Port

Pin No	Pin Details	Description
1	TMDS_LANE2+	Display RED+ differential signal
2	D2_GND	Red Pair Ground
3	TMDS_LANE2-	Display RED- differential signal
4	TMDS_LANE1+	Display GREEN+ differential signal
5	D1_GND	Green Pair Ground
6	TMDS_LANE1-	Display GREEN- differential signal
7	TMDS_LANE0+	Display BLUE+ differential signal
8	D0_GND	Blue Pair Ground
9	TMDS_LANE0-	Display BLUE- differential signal



10	TMDS_CLK+	Display Clock+ differential signal
11	CLK_GND	Clock pair Ground
12	TMDS_CLK-	Display Clock- differential signal
13	CEC (pull-up to 3.3V), Not supported	Consumer Electronic Control
14	NC	No Connection
15	HDMI_SDVO_CTL_CLK	EDID I2C Clock
16	HDMI_SDVO_CTL_DAT	EDID I2C Data
17	GND	Ground
18	VOUT_5	5V Power Supply
19	HDMI_HPD#	HDMI Cable Hot plug detect
M1,M2, M3,M4	Mechanical support	Mechanical support

Figure 23: HDMI Port Pin Out

### 2.12 AC'97 Interface

AC'97 four wire signals from the MXM Connector are connected to Audio Codec. The Audio CODEC used on the Q7 Generic Carrier Card is ALC5610 from Realtek with inbuilt Headphone & Loud Speaker Amplifier which is used to provide a complete audio solution for portable products. The Audio CODEC is able to achieve ultra-low power with very high performance and functionality. Audio In and Out jacks both are physically located on top of the board.

ALC5610 accepts the following inputs: Line input, Microphone input with MIC bias and Digital AC'97 input.

ALC5610 supports the following outputs: Line output, Headphone output, Digital AC'97 output.



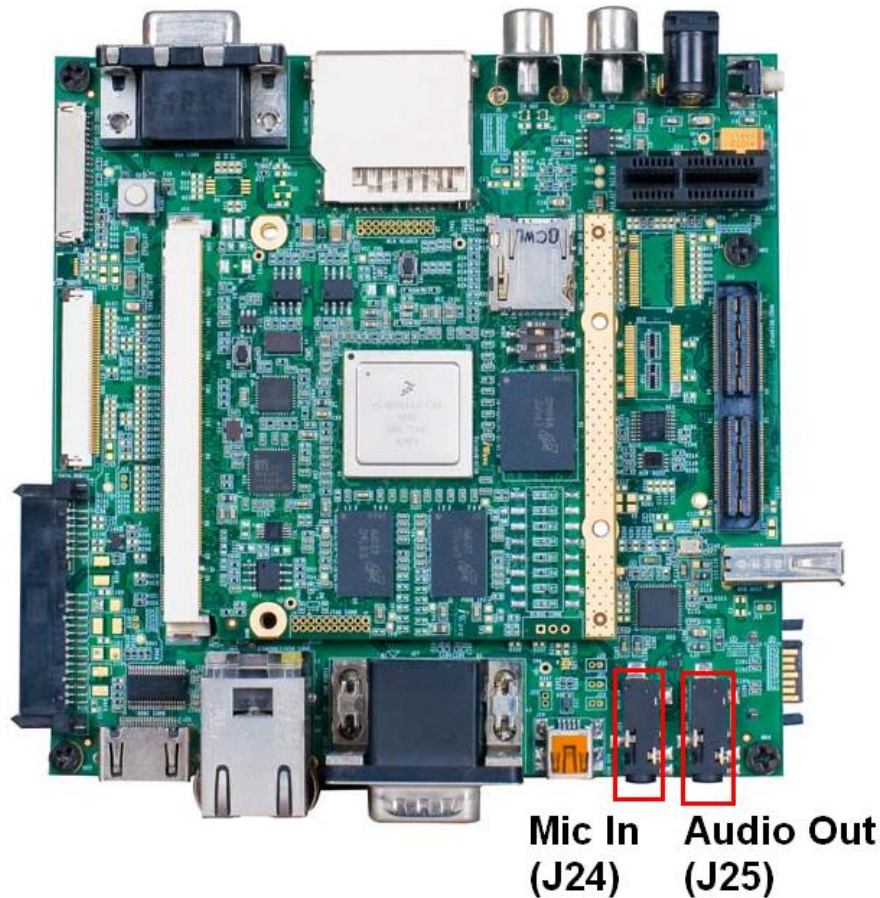
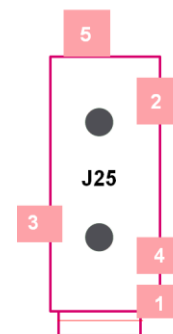


Figure 24: Audio Jack

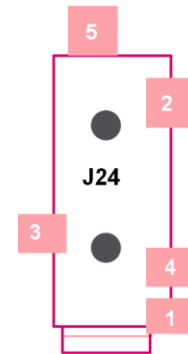
Pin.NO	Pin Detail	Description
1	GND	Ground
2	HP_L	Headphone Left
3	HP_R	Headphone Right
4	HP_DETECT	Head Phone Detection
5	NC	No Connection

Figure 25: Audio OUT Jack Pin Out



Pin.NO	Pin Detail	Description
1	GND	Ground
2	MIC	Microphone Signal
3	NC	No Connection
4	MIC_DET_B	Microphone Detection
5	MIC_INT	Internal MIC connection

Figure 26: Mic IN Jack Pin Out



## 2.13 PCIe0 Interface

PCIe port0 signals from MXM connector are connected to X1 Slot PCIe connector. PCIe X1 slot physically located on top of the board.

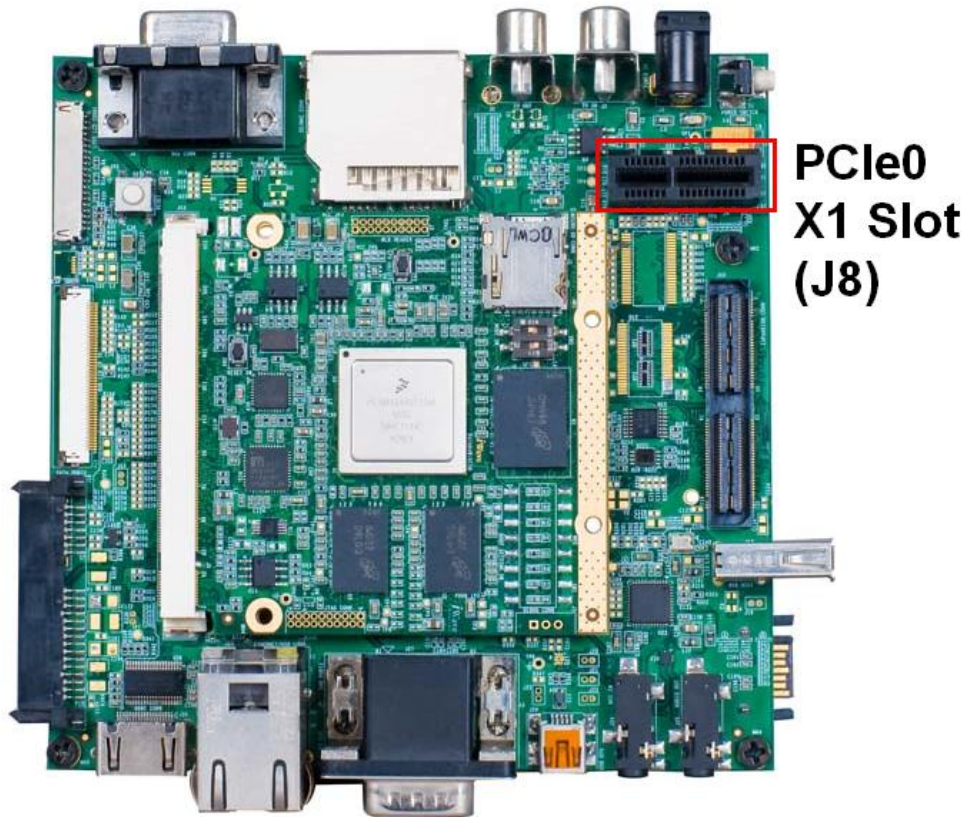
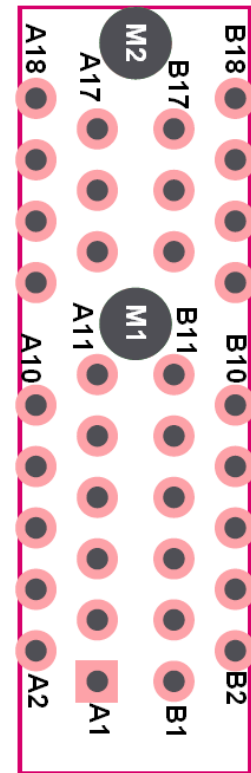


Figure 27: PCIe0 X1 Slot

## Generic Q7 Carrier Card Hardware User Guide

Pin No	Pin Details	Description
A1	NC	No Connection
A2	VCC_12V	12V Power Supply
A3	VCC_12V	12V Power Supply
A4	GND	Ground
A5	NC	No Connection
A6	NC	No Connection
A7	NC	No Connection
A8	NC	No Connection
A9	VCC_3V3	3V Power Supply
A10	VCC_3V3	3V Power Supply
A11	PCIE1_RST#	PCIe Reset signal
A12	GND	Ground
A13	PCIE1_CLK+	PCIe reference clock differential pair
A14	PCIE1_CLK-	
A15	GND	Ground
A16	PCIE0_RX+	PCIe0 receive signal differential pair
A17	PCIE0_RX-	
A18	GND	Ground
B1	VCC_12V	12V Power Supply
B2	VCC_12V	12V Power Supply
B3	NC	No Connection
B4	GND	Ground
B5	SMB_CLK	System Bus Clock
B6	SMB_DAT	System Bus Data
B7	GND	Ground
B8	VCC_3V3	3V Power Supply
B9	NC	No Connection
B10	VCC_3V3A	3V Always Power Supply
B11	PCIE_WAKE#	PCIe Wake signal
B12	NC	No Connection
B13	GND	Ground
B14	PCIE0_TX+	PCIe0 transmit signal differential pair
B15	PCIE0_TX	
B16	GND	Ground
B17	TXPCIECLK_OE1	Clock enable signal to PCIe



**J8**

		clock buffer. OE=1 clock enabled.
B18	GND	Ground
M1,M2	Mechanical Support	Mechanical Support

Figure 28: PCIe0 X1 Slot Pin Out

## 2.14 Mini PCIe Slot

USB Host3 signals from the MXM connector is connected to Mini PCIe connector for 3G module interface. Mini PCIe slot is physically located on bottom of the board.

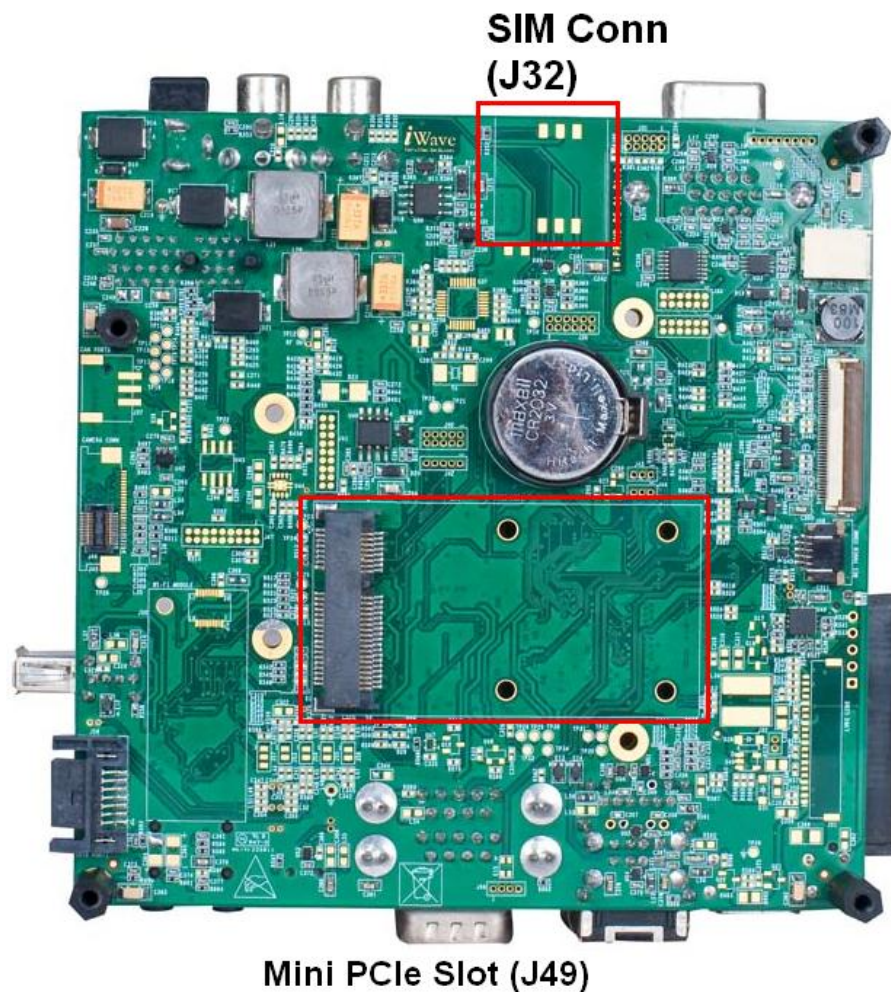
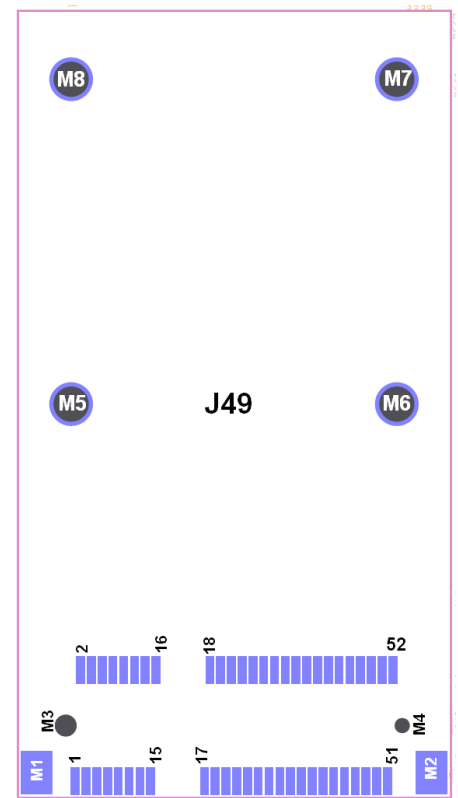


Figure 29: Mini PCIe Slot



# Generic Q7 Carrier Card Hardware User Guide

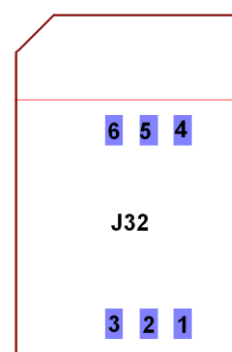
Pin No	Pin Details	Description
1	PCle_WAKE#	PCle Wake Signal
2	VCC_3V3	3.3V Power Supply
3	NC	No Connection
4	GND	Ground
5	NC	No Connection
6	3G_1V5 (optional)	Optional 3G supply, not supported in present configuration
7	NC	No Connection
8	VSIM_3V	SIM Supply from the Module
9	GND	Ground
10	UICC_DATA	SIM Data
11	PCle0_CLK-	PCle reference clock-
12	UICC_CLK	SIM Clock
13	PCle0_CLK+	PCle reference clock+
14	UICC_RESET	SIM Reset
15	GND	Ground
16	NC	No Connection
17	NC	No Connection
18	GND	Ground
19	NC	No Connection
20	W_DISABLE	Wireless Disable Input
21	GND	Ground
22	PCIE0_RST#	PCle Reset
23	B_PCIE0_RX- (optional)	not supported in present configuration
24	VCC_3V3	3.3V Power Supply
25	B_PCIE0_RX+(optional)	not supported in present configuration
26	GND	Ground
27	GND	Ground
28	3G_1V5 (optional)	Optional 3G supply, not supported in present configuration
29	GND	Ground
30	SMB_CLK	System BUS Clock
31	B_PCIE0_TX-	not supported in present



	(optional)	configuration
32	SMB_DAT	System BUS Data
33	B_PCIE0_TX+(optional)	not supported in present configuration
34	GND	Ground
35	GND	Ground
36	USB_P3-	USB3 DATA-
37	GND	Ground
38	USB_P3+	USB3 DATA+
39	VCC_3V3	3.3V Power Supply
40	GND	Ground
41	VCC_3V3	3.3V Power Supply
42	LED_WWAN#	LED Connection
43	GND	Ground
44	LED_WLAN#-(optional)	not supported in present configuration
45	NC	No Connection
46	LED_WPAN#-(optional)	not supported in present configuration
47	NC	No Connection
48	3G_1V5 (optional)	Optional 3G supply, not supported in present configuration
49	NC	No Connection
50	GND	Ground
51	NC	No Connection
52	VCC_3V3	3.3V Power Supply
M1,M2, M3,M4, M5,M6, M7,M8	Mechanical Support	Mechanical Support

Figure 30: Mini PCIe Slot Pin Out

Pin.NO	Pin Detail	Description
1	VCC	SIM Power Supply
2	RST	SIM Reset
3	CLK	SIM Clock
4	GND	Ground



5	VPP	SIM Power Supply
6	IO	SIM IO Data

Figure 31: SIM Slot Pin Out

## 2.15 Display LVDS Interface

Qseven support two LVDS interface from MXM connector with some control interfaces. The Q7 Generic Carrier Card supports both LVDS interfaces with two independent LVDS connectors with backlight interfaces of 15V 300mA output. LVDS0 connector is physically located on top of board & Backlight connector on bottom of the board. LVDS1 & backlight connector physically located on bottom of board.

Note: If any RGB LCD is interfaced to Q7 carrier card, LVDS Channel0 can't be used.

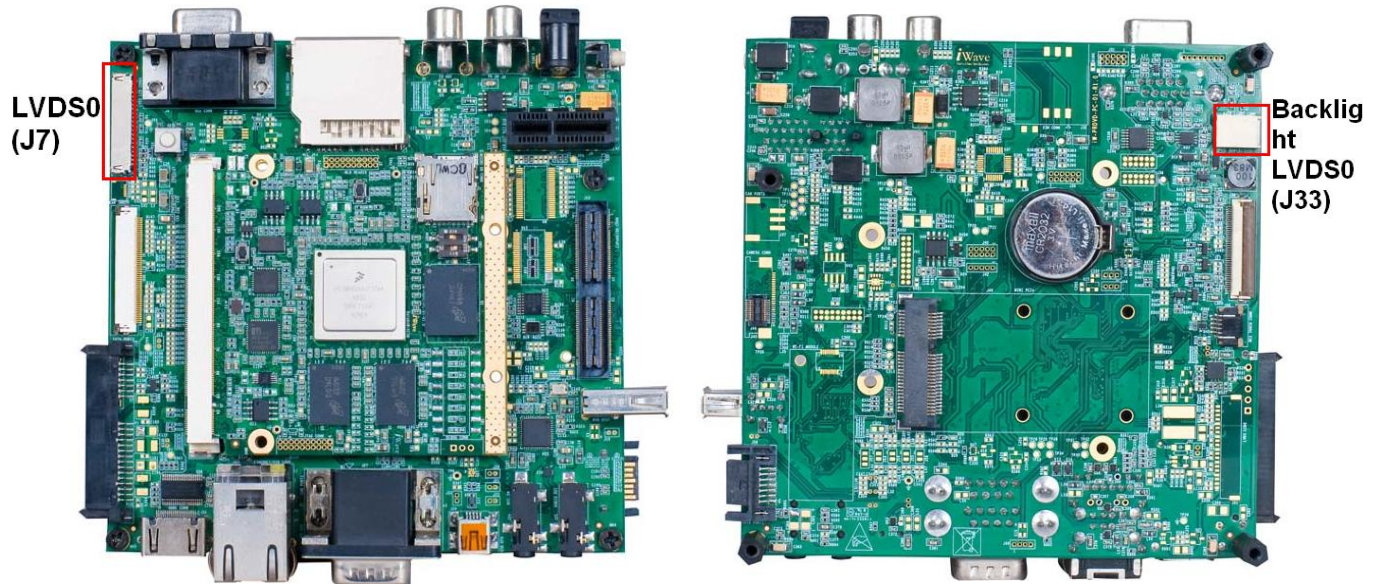


Figure 32: LVDS0 Connectors

Pin No	Pin Detail	Description
1	TFT1_VCC_3V3	Supply voltage for TFT
2	TFT1_VCC_3V3	Supply voltage for TFT
3	GND	Ground
4	GND	Ground
5	LVDS_A0-	LVDS primary channel differential pair 0.
6	LVDS_A0+	
7	GND	Ground
8	LVDS_A1-	LVDS primary channel differential pair 1.
9	LVDS_A1+	

10	GND	Ground
11	LVDS_A2-	LVDS primary channel differential pair 2.
12	LVDS_A2+	
13	GND	Ground
14	LVDS_A_CLK-	LVDS primary channel differential pair clock lines.
15	LVDS_A_CLK+	
16	GND	Ground
17	LVDS_A3-	LVDS primary channel differential pair 3.
18	LVDS_A3+	
19	GND	Ground
20	GND	Ground
M1, M2	Mechanical Support	Mechanical Support

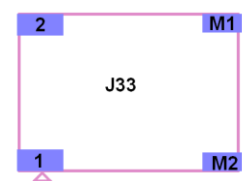
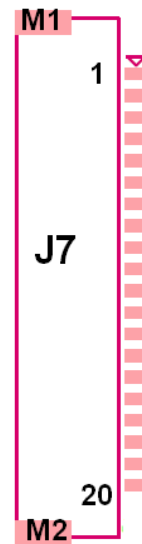
Note: LVDS Connector part number: DF19G-20P-1H(54) / DF19G-20P-1H (56)

Figure 33: LVDS0 Connector Pin Out

Pin No	Pin Detail	Description
1	LED_A0	LED Anode
2	LED_K0	LED Cathode
M1,M2	Mechanical Support	Mechanical Support

Note: Backlight Connector part number: SM02B-BHSS-1-TB

Figure 34: LVDS0 Backlight Connector Pin Out





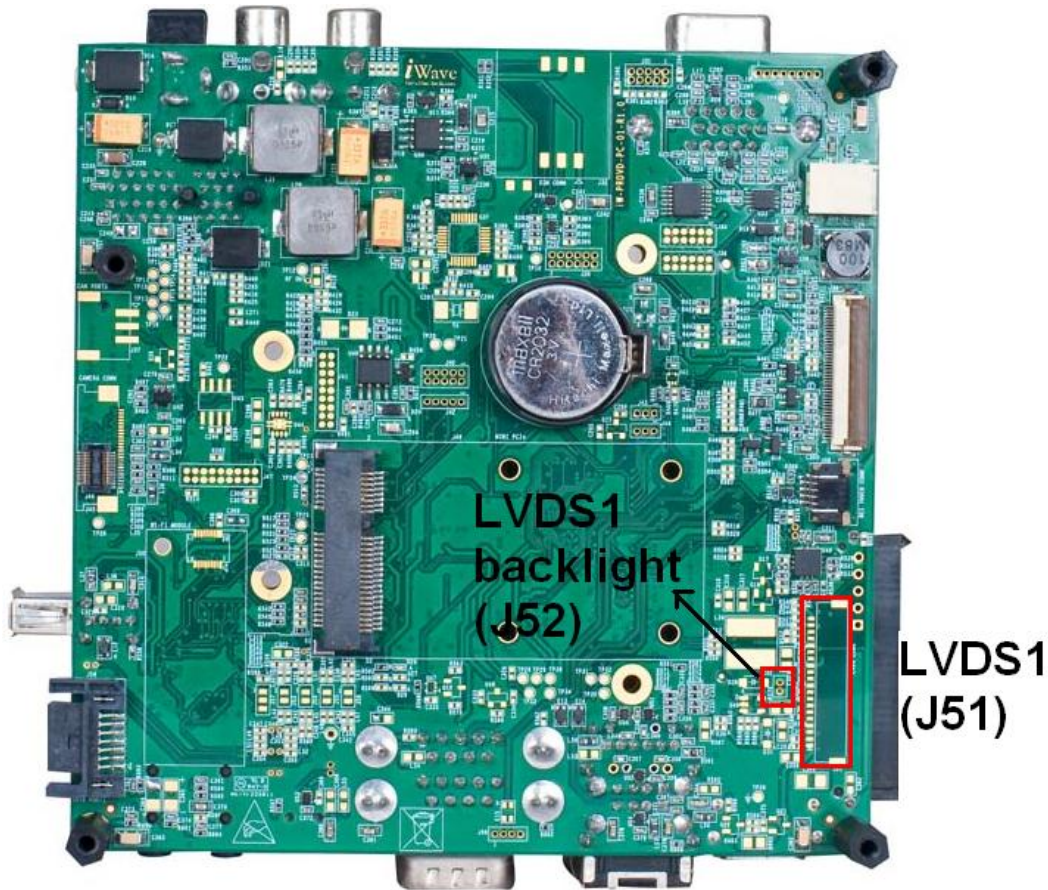
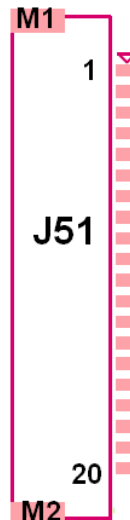


Figure 35: LVDS1 Connectors

Pin No	Pin Detail	Description
1	TFT1_VCC_3V3	Supply voltage for TFT
2	TFT1_VCC_3V3	Supply voltage for TFT
3	GND	Ground
4	GND	Ground
5	LVDS_B0-	LVDS secondary channel differential pair 0.
6	LVDS_B0+	
7	GND	Ground
8	LVDS_B1-	LVDS secondary channel differential pair 1.
9	LVDS_B1+	
10	GND	Ground
11	LVDS_B2-	LVDS secondary channel differential pair 2.
12	LVDS_B2+	
13	GND	Ground



14	LVDS_B_CLK-	LVDS secondary channel differential pair clock lines.
15	LVDS_B_CLK+	
16	GND	Ground
17	LVDS_B3-	LVDS secondary channel differential pair 3.
18	LVDS_B3+	
19	GND	Ground
20	GND	Ground
M1, M2	Mechanical Support	Mechanical Support

Note: LVDS Connector part number: DF19G-20P-1H(54) / DF19G-20P-1H (56)

Figure 36: LVDS1 Connector Pin Out

Pin No	Pin Detail	Description
1	LED_A1	LED Anode
2	LED_K1	LED Cathode

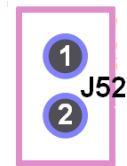


Figure 37: LVDS1 Backlight Connector Pin Out

**Note:** Presently backlight LED driver output is configured for 15V and 300mA. But backlight voltages and current requirement is different for different LVDS LCD's. To meet the power requirement for particular LCDs the following hardware changes has to be done on carrier card for both LCDs backlight LED drivers.

LED Driver part Number: LM3410XQMF/NOPB

### Settings for primary LVDS backlight LED driver:

- Change **D19** Zener Diode from 15V to required voltage. (Populated diode part number is BZT52C15-7-F)
- Change Current sensing resistor **R<sub>SET</sub>**: **R403** to required calculated value to set the output current. Where  $V_{FB} = 190\text{mV}$ ,  $I_{LED}$  is current required for LCD backlight LEDs.

$$\frac{V_{FB}}{R_{SET}} = I_{LED}$$

### Settings for Secondary LVDS backlight LED driver:

- Change **D31** Zener Diode from 15V to required voltage. (Populated diode part number is BZT52C15-7-F)
- Change Current sensing resistor **R<sub>SET</sub>**: **R576** to required calculated value to set the output current. Where  $V_{FB} = 190\text{mV}$ ,  $I_{LED}$  is current required for LCD backlight LEDs.

$$\frac{V_{FB}}{R_{SET}} = I_{LED}$$

## 2.16 7" Resistive Touch LCD Interface

The Q7 Generic Carrier Card supports 7" LCD with resistive touch interface. This 7" LCD supports 800x480 resolutions with 16BPP. This LCD uses LVDS channel0 signals from MXM connector. LVDS to 24bit RGB converter is placed on carrier card to interface with RGB LCD. 7" LCD and touch connector are physically located on bottom of board.

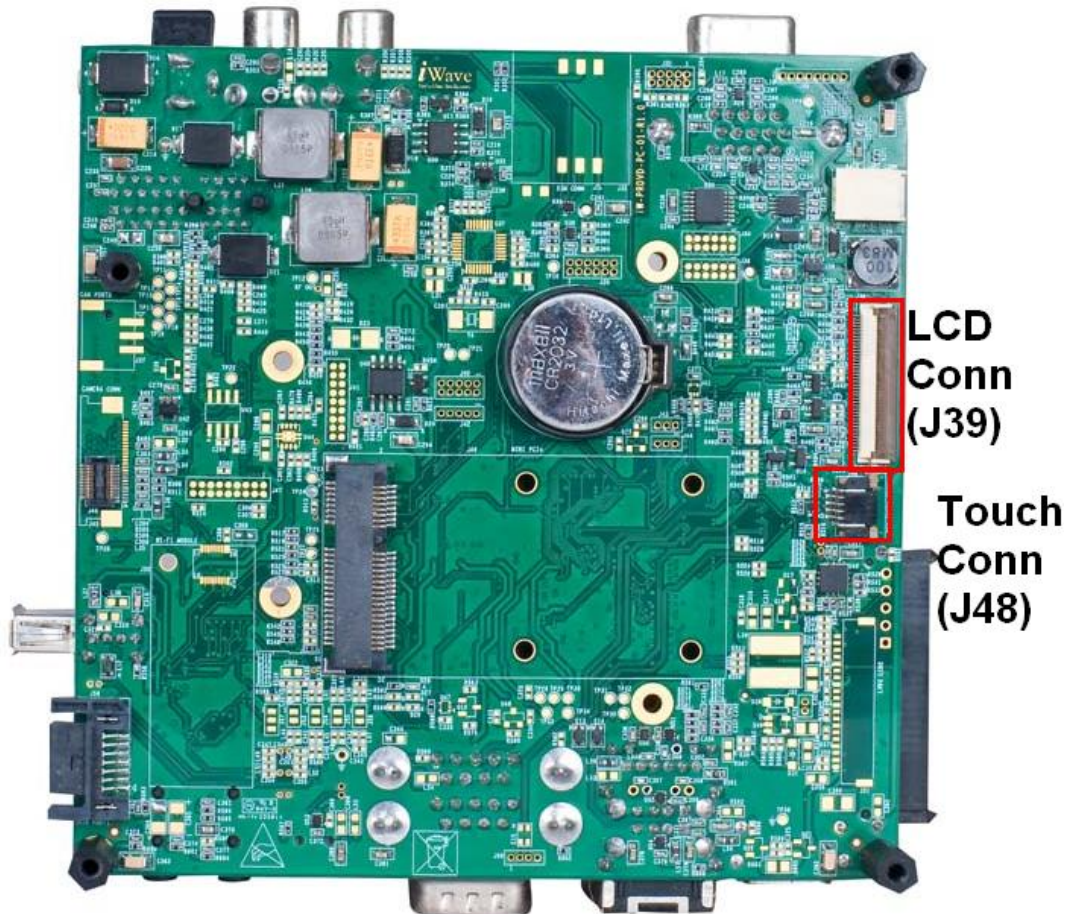


Figure 38: 7" Resistive LCD Connector

Pin No	Pin Detail	Description
1	L_VLED	Power Voltage for LED Driver
2	L_VLED	Power Voltage for LED Driver
3	LVDS_BLT_CTRL_GP_PWM_OUT0	PWM for backlight
4	GLED1	Ground
5	GLED2	Ground
6	TFT1_VCC_3V3	Supply voltage for TFT

7	TFT1_VCC_3V3	Supply voltage for TFT
8	MODE1	DE or HV mode control
9	DISP_EN	Data Enable
10	DISP_VSYNC	VSYNC signal input
11	DISP_HSYNC	HSYNC signal input
12	GND	Ground
13	DISP_B7	Blue Data 7 (MSB)
14	DISP_B6	Blue Data 6
15	DISP_B5	Blue Data 5
16	GND	Ground
17	DISP_B4	Blue Data 4
18	DISP_B3	Blue Data 3
19	DISP_B2	Blue Data 2 (LSB+2)
20	GND	Ground
21	DISP_G7	Green Data 7 (MSB)
22	DISP_G6	Green Data 6
23	DISP_G5	Green Data 5
24	GND	Ground
25	DISP_G4	Green Data 4
26	DISP_G3	Green Data 3
27	DISP_G2	Green Data 2 (LSB+2)
28	GND	Ground
29	DISP_R7	Red Data 7 (MSB)
30	DISP_R6	Red Data 6
31	DISP_R5	Red Data 5
32	GND	Ground
33	DISP_R4	Red Data 4
34	DISP_R3	Red Data 3
35	DISP_R2	Red Data 2 (LSB+2)
36	GND	Ground
37	DISP_CLK	Display Clock
38	GND	Ground
39	L/R1	Left or Right Scanning Direction
40	U/D1	Up or Down Scanning Direction

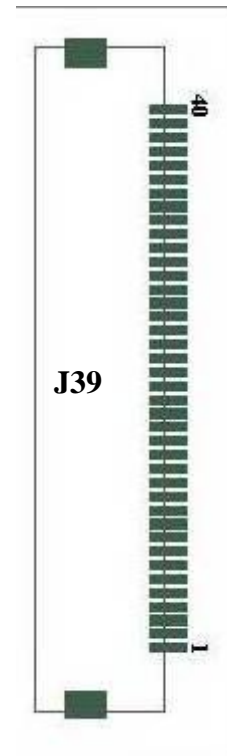


Figure 39: 7" Resistive LCD Connector Pin Out



Pin No	Pin Detail	Description
1	TSC_Y1	Touch Left Signals
2	TSC_X2	Touch Up Signals
3	TSC_Y2	Touch Right Signals
4	TSC_X1	Touch Down Signals

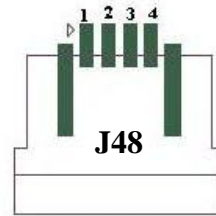


Figure 40: Resistive Touch Connector Pin Out

## 2.17 7" Capacitive Touch LCD Interface (optional)

The Q7 Generic Carrier Card supports 7" LCD with capacitive touch interface as an optional feature. This 7" LCD supports 800x480 resolutions with 24BPP. This LCD uses LVDS channel0 signals from MXM connector. LVDS to 24bit RGB converter is placed on carrier card to interface with RGB LCD. 7" capacitive touch LCD connector is physically located on top of board & I2C interface for capacitive touch located on bottom of the board.

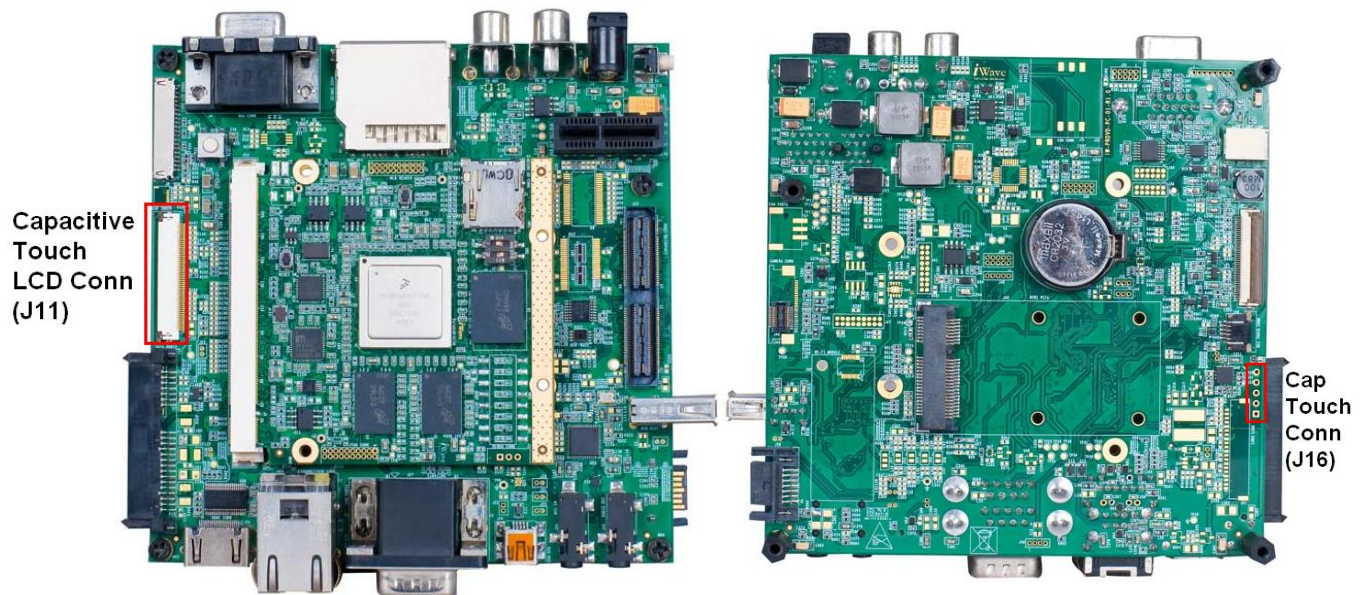
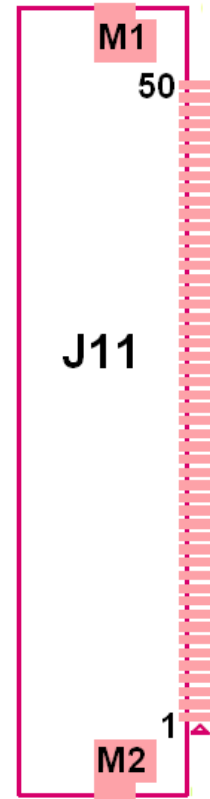


Figure 41: 7" Capacitive Touch LCD Connector

Pin No	Pin Detail	Description
1	LED_A0	LED Anode
2	LED_A0	LED Anode
3	LED_K0	LED Cathode
4	LED_K0	LED Cathode
5	GND	Ground

# Generic Q7 Carrier Card Hardware User Guide

6	VCOM	Common Voltage
7	VDD_LCD	Digital Power
8	MODE_LCD	DE/SYNC mode select. Normally pull high H: DE mode. L: HSD/VSD mode
9	DISP_EN	Data Enable signal
10	DISP_VSYNC	Vertical sync input. Negative polarity
11	DISP_HSYNC	Horizontal sync input. Negative polarity
12	DISP_B7	Blue Data Input (MSB)
13	DISP_B6	Blue Data Input
14	DISP_B5	Blue Data Input
15	DISP_B4	Blue Data Input
16	DISP_B3	Blue Data Input
17	DISP_B2	Blue Data Input
18	DISP_B1	Blue Data Input
19	DISP_B0	Blue Data Input (LSB)
20	DISP_G7	Green Data Input (MSB)
21	DISP_G6	Green Data Input
22	DISP_G5	Green Data Input
23	DISP_G4	Green Data Input
24	DISP_G3	Green Data Input
25	DISP_G2	Green Data Input
26	DISP_G1	Green Data Input
27	DISP_G0	Green Data Input (LSB)
28	DISP_R7	Red Data Input (MSB)
29	DISP_R6	Red Data Input
30	DISP_R5	Red Data Input
31	DISP_R4	Red Data Input
32	DISP_R3	Red Data Input
33	DISP_R2	Red Data Input
34	DISP_R1	Red Data Input
35	DISP_R0	Red Data Input (LSB)
36	GND	Ground
37	DISP_CLK	Clock input
38	GND	Ground



39	SHLR	Left or Right Display Control
40	UPDN	Up / Down Display Control
41	VGON	Positive Power for TFT
42	VGOFF	Negative Power for TFT
43	AVDD_LCD	Analog Power
44	MAIN_RESET2#	Global reset pin. Active low to enter reset state. Connected with an RC reset circuit for stability. (R=10KΩ, C=1μF)
45	NC	No Connection
46	VCOM	Common Voltage
47	DITH	Dithering setting DITH="H" 6bit resolution(last 2 bit of input data truncated) DITH="L" 8bit resolution(default setting)
48	GND	Ground
49	NC	No Connection
50	NC	No Connection
M1,M2	Mechanical Support	Mechanical Support

Figure 42: 7`` Capacitive Touch LCD Connector Pin Out

Pin No	Pin Detail	Description
1	VDD_TOUCH	Power Supply
2	GND	Ground
3	CHG	Touch Interrupt
4	I2C_CLK	I2C Clock
5	I2C_DAT	I2C Data

Figure 43: Capacitive touch Connector Pin Out





## 2.18 SDIO Wi-Fi (Optional)

SDIO Interfaces from MXM connector is connected to Taiyo Yuden SDIO Wi-Fi module “WYSAAVDX7” & MMC Slot. Since this feature is muxed with SD/MMC interface, either one can be used at a time; by default configuration this feature will not be supported. SDIO Wi-Fi connector is physically located on bottom of board.



Figure 44: SDIO Wi-Fi Module Connector

Pin No	Pin Detail	Description
1	GND	Ground
2	SDIO_DAT1	Data Line (bit1)
3	SDIO_DAT0	Data Line (bit0)
4	GND	Ground
5	SDIO_CLK	SDIO Clock Signal
6	VCC_3V3	Power Supply
7	SDIO_CMD	SDIO Command Signal
8	SDIO_DAT3	Data Line (bit3)

9	SDIO_DAT2	Data Line (bit2)
10	GND	Ground
11	GND	Ground
12	SLEEP_CLK	External Sleep Clock (32.768KHz) For low power mode
13	GND	Ground
14	WIFI_PDN	Power Down (Active Low)
15	WIFI_RST	Reset (Active Low)
16	WL_HOST_WKUP	WLAN Wakeup
17	HOST_WL_WKUP	HOST Wakeup
18	GND	Ground
19	VCC_5V	Power Supply
20	VCC_5V	Power Supply
M	Mechanical Support	Mechanical Support



Figure 45: SDIO Wi-Fi Module Connector Pin Out

## 2.19 SPI Header

The Q7 Generic Carrier Card supports SPI header for external interface, SPI signals are connected to MXM connector. SPI header is physically located on bottom of board.

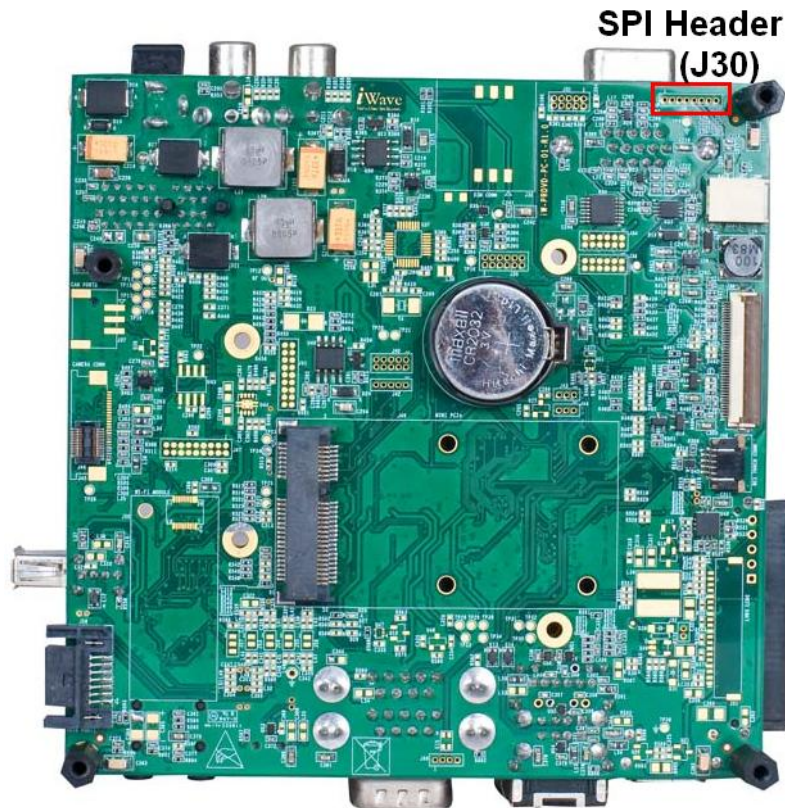


Figure 46: SPI Connector

Pin No	Pin Detail	Description
1	SPI_CS0#	SPI Chip select 0
2	SPI_MISO	Master In Slave Out (RX to CPU)
3	GND	Ground
4	SPI_MOSI	Master Out Slave In (TX from CPU)
5	SPI_SCK	Clock
6	VCC_3V3	3.3V Power Supply
7	SPI_CS1#	SPI Chip select 1
8	GND	Ground

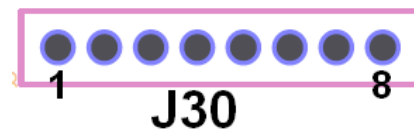


Figure 47: SPI Connector Pin Out

## 2.20 RTC Battery

The Q7 Generic Carrier Card supports on board 3.3V backup Coin cell battery for RTC. This coin cell battery is connected MXM connector VCC-RTC pin.

### 2.21 Additional Features from Expansion connectors

The Q7 Generic Carrier Card provides some additional features like VGA, TV-In, Camera, TV-Out, Secondary CAN, Secondary UART, Keypad etc. All additional interfaces are provided through two 80pin expansion connectors and these interfaces are non-standard interfaces from Qseven. Some interfaces are specific to iWave Qseven CPU modules. Please contact iWave for more information and support.

#### 2.21.1 VGA Connector (Optional)

The Q7 Generic Carrier Card supports VGA interface through 80pin expansion connector as an optional features. This is not standard interface recommended in Qseven, it is additional interface provided by iWave to support VGA interfaces that is directly available from some processors like i.Mx53X. VGA connector is physically located on top of board.

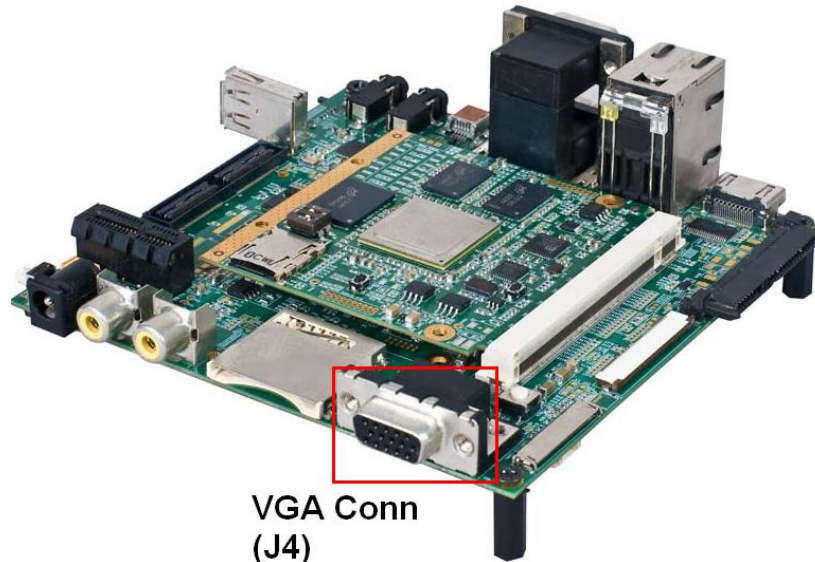


Figure 48: 15-Pin D-Sub VGA Connector

Pin No	Pin Detail	Description
1	IOR	Analog Red Signal
2	IOG	Analog Green Signal
3	IOB	Analog Blue Signal
4	NC	No Connection
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	VCC_5V	5V Power
10	GND	Ground
11	NC	No Connection
12	VGA_SDA	I2C Data
13	VGA_HS	Horizontal Synchronization
14	VGA_VS	Vertical Synchronization
15	VGA_SCL	I2C Clock
SH1,SH2	Shield Ground	Shield Ground

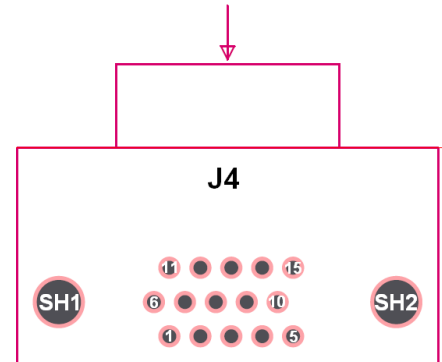
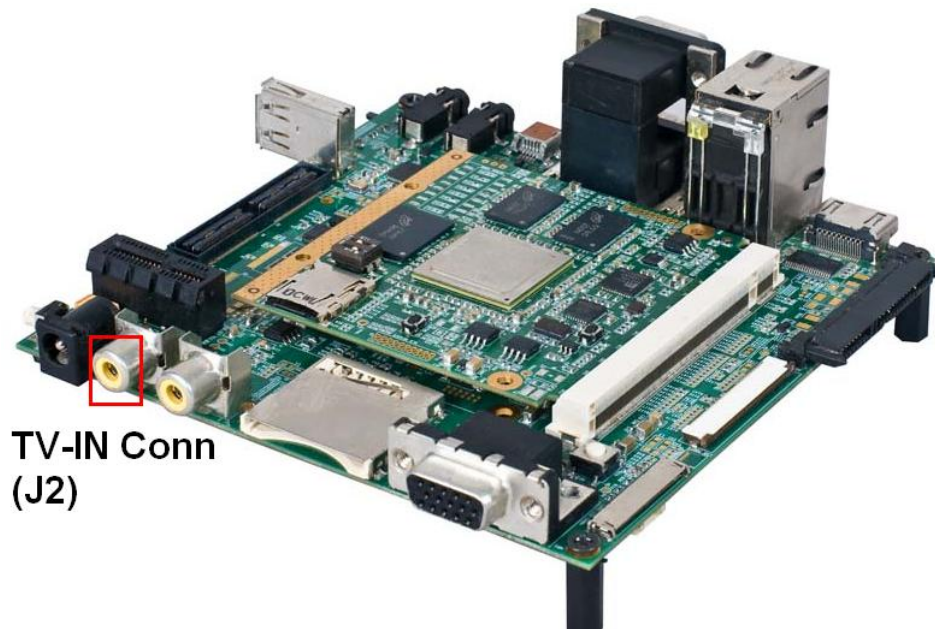


Figure 49: 15-Pin D-Sub VGA Connector Pin Out

## 2.21.2 TV-In Interface

The Q7 Generic Carrier Card supports TV-In interface through 80pin expansion connector. ADC “TVP5150AM1IPBSR” from Texas Instruments is present on Q7 carrier card and connected through processor CMOS camera interfaces. TV-In RCA connector is physically located on top of board.





TV-IN Conn  
(J2)

Figure 50: TV-In Connector

Pin No	Pin Detail	Description
1	GND	Ground
2	VIDEO_IN_A	Analog Video input
3	GND	Ground
4	GND	Ground

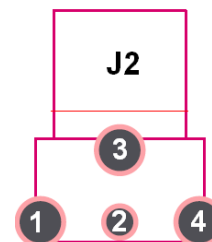


Figure 51: TV-In Connector Pin Out

### 2.21.3 Camera Interface

The Q7 Generic Carrier Card supports 8/10bit CMOS Camera Interface through 80pin expansion connectors. External clock for camera is provided using on board Oscillator of frequency 26MHz. 24-pin Camera connector is physically located on bottom of board.

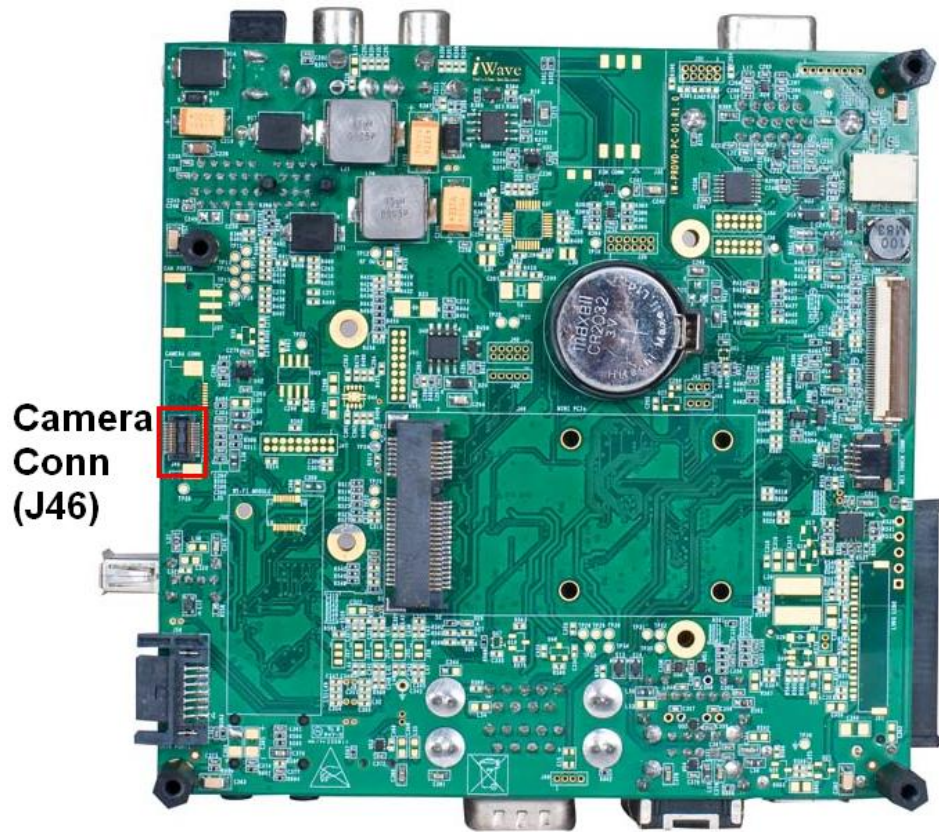
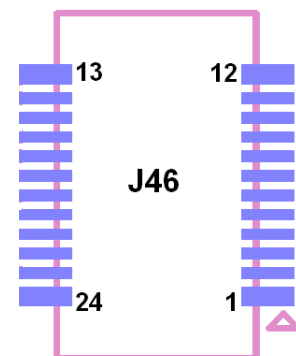


Figure 52: Camera Connector

Pin No	Pin Detail	Description
1	NC	No Connection
2	AGND	Analog Ground
3	B_B_I2C1_SDA	I2C Data
4	VCC_2V8_CAM	Analog Power Supply
5	B_B_I2C1_SCL	I2C Clock
6	B_B_RESET_OUT n	Reset In, Active Low 0= Reset asserted
7	B_CSI0_VSYNC	Vertical Synch
8	B_CAM_PWDN1	Power Down, Active High 1= Power Down mode
9	B_CSI0_HSYNC	Horizontal Synch
10	VCC_1V8	Digital Power Supply
11	DOVDD	IO Power Supply
12	B_CSI0_D9	Camera Data9





13	B_CSIO_MCLK	Camera Clock
14	B_CSIO_D8	Camera Data8
15	DGND	Digital Ground
16	B_CSIO_D7	Camera Data7
17	B_CSIO_PIXCLK	Camera Pixel Clock
18	B_CSIO_D6	Camera Data6
19	B_CSIO_D2	Camera Data2
20	B_CSIO_D5	Camera Data5
21	B_CSIO_D3	Camera Data3
22	B_CSIO_D4	Camera Data4
23	B_CSIO_D1	Camera Data1
24	B_CSIO_D0	Camera Data0

Figure 53: Camera Connector Pin Out

## 2.21.4 TV-Out Interface (Optional)

The Q7 Generic Carrier Card supports TV-Out interface through 80pin expansion connector as an optional features. This is not standard interface recommended in Qseven, it is additional interface provided by iWave to support TV-Out that is directly available from some processors like i.Mx53X, i.Mx51X. TV-Out connector is physically located on top of board.

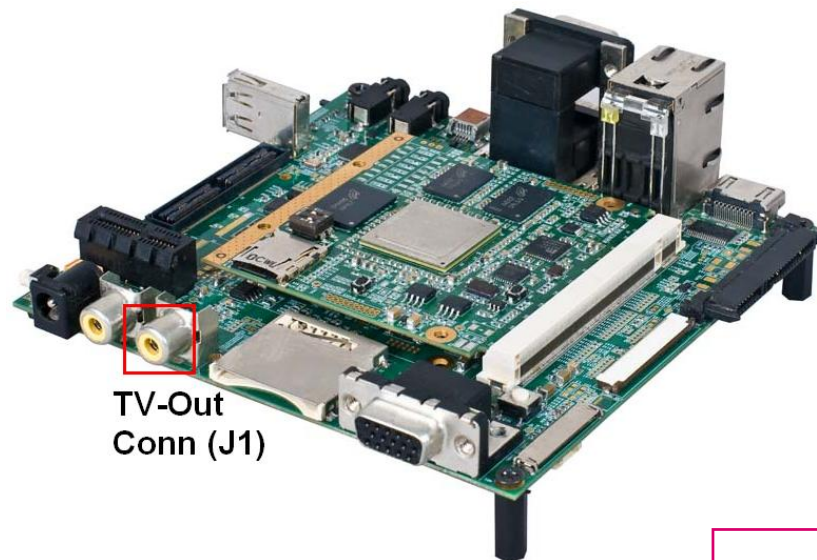
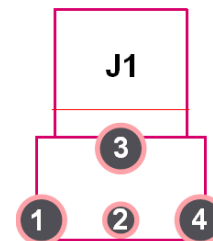


Figure 54: TV-Out Connector

Pin No	Pin Detail	Description
1	GND	Ground
2	VIDEO_OUT	Analog Video output



3	GND	Ground
4	GND	Ground

Figure 55: TV-Out Connector Pin Out

## 2.21.5 Secondary CAN (Optional)

The Q7 Generic Carrier Card supports Secondary CAN interface through 80pin expansion connector. On board CAN transceiver with three pin connector is provided for external interface from the Q7 carrier card. Secondary CAN connector is physically located on bottom of board.

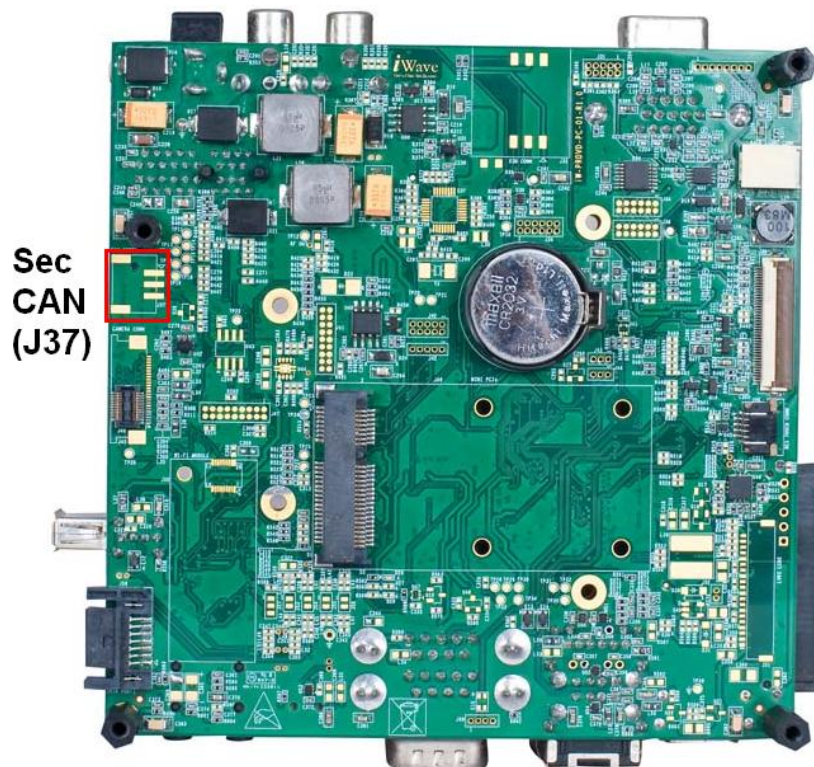


Figure 56: Secondary CAN Connector

Pin No	Pin Detail	Description
1	GND	Ground
2	CAN1H	CAN Differential Pair High Side
3	CAN1L	CAN Differential Pair Low Side
M1,M2	Mechanical Support	Mechanical Support

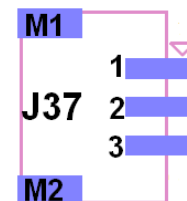


Figure 57: Secondary CAN Connector Pin Out

## 2.21.6 Secondary UART

The Q7 Generic Carrier Card supports Secondary UART interface through 80pin expansion connector. On board UART transceiver with five pin connector is provided for external interface from the Q7 carrier card. Secondary UART connector is physically located on bottom of board.

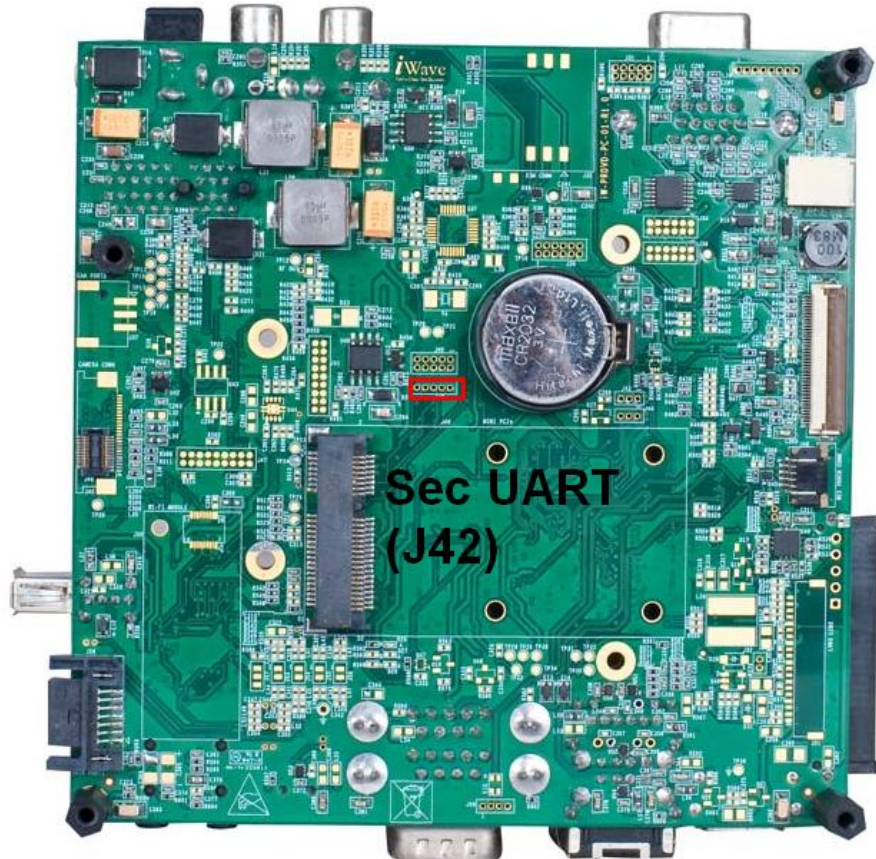


Figure 58: Secondary UART Connector

Pin No	Pin Detail	Description
1	TXD2	Transmit Line from CPU
2	NC	No Connection
3	RXD2	Receive Line to CPU
4	NC	No Connection
5	GND	Ground

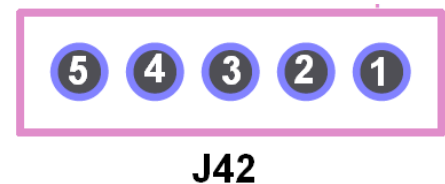


Figure 59: Secondary UART Connector Pin Out



## 2.21.7 Keypad interface

The Q7 Generic Carrier Card supports 4X4 keypad interface through 80pin expansion connectors. Keypad connector is physically located on bottom of board.

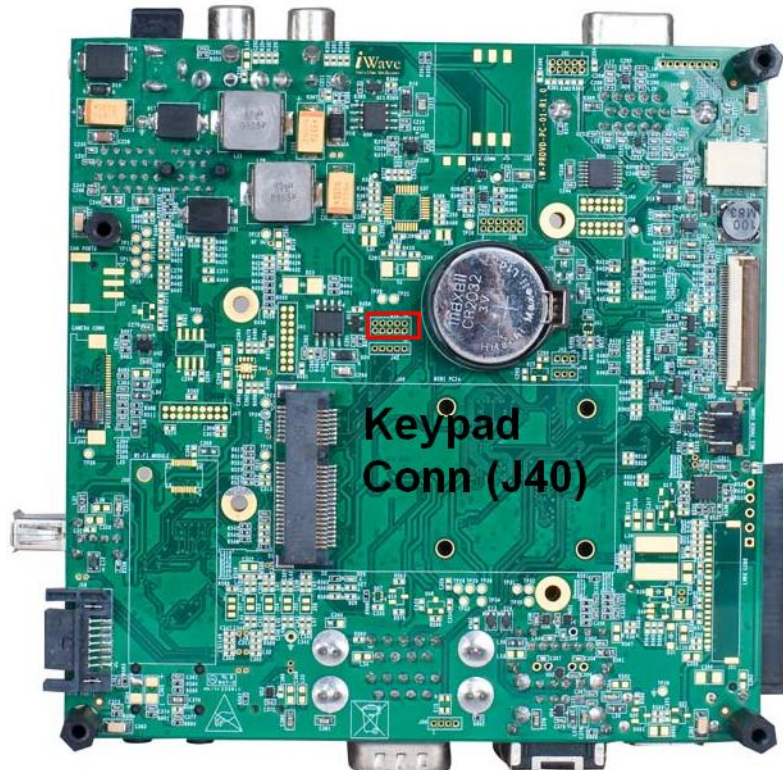


Figure 60: Keypad Connector

Pin No	Pin Detail	Description
1	KP_ROW0	Keypad Row0
2	KP_ROW1	Keypad Row1
3	KP_ROW2	Keypad Row2
4	KP_ROW3	Keypad Row3
5	GND	Ground
6	GND	Ground
7	KP_COL0	Keypad Column0
8	KP_COL1	Keypad Column1
9	KP_COL2	Keypad Column2
10	KP_COL3	Keypad Column3



J40

Figure 61: Keypad Connector Pin Out

## 2.22 Expansion Connectors

The Q7 Generic Carrier Card has two 80pin board to board expansion connectors. These two connectors are used to bring the unused pins and features from iWave's Qseven CPU modules to Q7 Generic Carrier Card. Please note that many pins are muxed, so that not all features are available at the same time and also some features are specific to some CPU modules. Refer datasheet or user manual of variant iWave Qseven CPU modules for more information.

Below interfaces are supported by Expansion Headers,

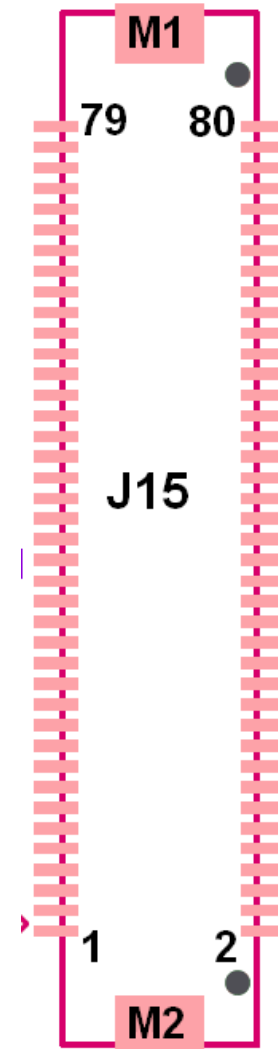
- ✓ GPIOs
- ✓ TV-In
- ✓ Camera
- ✓ Secondary UART
- ✓ Secondary CAN
- ✓ Keypad (4x4)
- ✓ Touch Interface
- ✓ VGA
- ✓ TV-Out

Table 5: Expansion Connector1 Pin Out

Pin#	Pin Name in carrier card	Interface	I/O Level
1	GND		
2	GPPIN_0	GPIO	3V3
3	GPPIN_1		3V3
4	GPPIN_2		3V3
5	GPPIN_3		3V3
6	GPPIN_4		3V3
7	GPPIN_5		3V3
8	GPPIN_6		3V3
9	GPPIN_7		3V3
10	GPPIN_8		3V3
11	GPPIN_9		3V3
12	GPPIN_10		3V3
13	GPPIN_11		3V3
14	GPPIN_12		3V3
15	GPPIN_13		3V3
16	GPPIN_14		3V3

# Generic Q7 Carrier Card Hardware User Guide

17	GPPIN_15		3V3
18	GPPIN_16		3V3
19	GPPIN_PWM2	PWM	3V3
20	GPPIN_20	GPIO	3V3
21	GPPIN_21		3V3
22	GPPIN_22		3V3
23	LVDS2_BLEN		3V3
24	W_DISABLE		3V3
25	LVDS2_PPEN		3V3
26	LS_ADC1_PD		3V3
27	GND		
28	LS_ADC1_GLCO	GPIO	3V3
29	ADC1_INTREQ		3V3
30	LS_ADC1_AVID		3V3
31	MIC_IN_DETECT		3V3
32	GND		
33	GPAI_MCLK	SSI	3V3
34	GPAI_LRCK		3V3
35	GPAI_BCLK		3V3
36	GPAI_DATA		3V3
37	GND		
38	HP_DETECT	GPIO	3V3
39	GND		
40	LVDS_BLEN	GPIO	3V3
41	TSC_INT#	GPIO	3V3
42	GND		
43	AC97_IRQOUT	GPIO	3V3
44	GND		
45	GPAO_DATA	SSI	3V3
46	GPAO_BCLK		3V3
47	GPAO_LRCK		3V3
48	AO_MCLK		3V3
49	GND		
50	UART1_TXD	UART	3V3
51	UART1_RTS		3V3
52	UART1_RXD		3V3
53	UART1_CTS		3V3



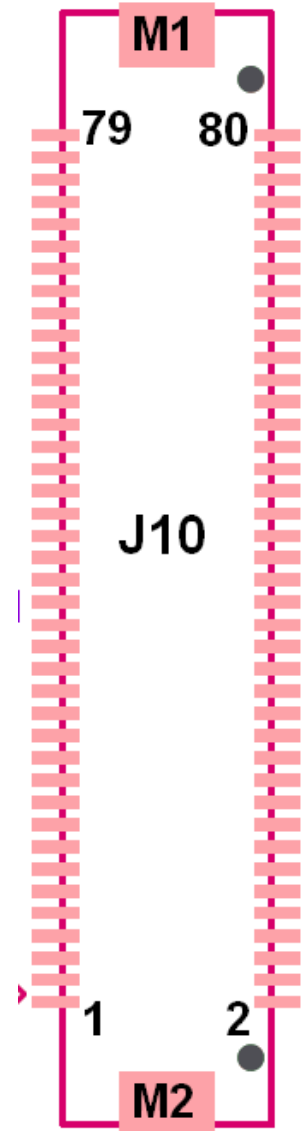
54	GND		
55	WIFI_PDN	GPIO	3V3
56	WL_HOST_WKUP		3V3
57	HOST_WL_WKUP		3V3
58	CAM_PWDN		3V3
59	GND		
60	UART2_RXD	UART	3V3
61	UART2_485RE#	GPIO	3V3
62	UART2_485DE	GPIO	3V3
63	UART2_TXD	UART	3V3
64	CSI1_MCLK	Camera	3V3
65	CSI1_PCLK		3V3
66	CSI1_HSYNC		3V3
67	CS1_VCLK		3V3
68	CSI1_VSYNC		3V3
69	CSI1_DAT0		3V3
70	CSI1_DAT1		3V3
71	CSI1_DAT2		3V3
72	CSI1_DAT3		3V3
73	CSI1_DAT4		3V3
74	CSI1_DAT6		3V3
75	CSI1_DAT7		3V3
76	CSI1_DAT5		3V3
77	GPPIN_17	GPIO	3V3
78	GPIN18_CAN1_RXD	CAN	3V3
79	GPIN19_CAN1_TXD		3V3
80	GND		

Figure 62: Expansion Connector1 Pin Out



**Table 6: Expansion Connector2 Pin Out**

Pin#	Pin Name in carrier card	Interface	I/O Level
1	TSC_X2	Touch	
2	TSC_X1		
3	TSC_Y2		
4	TSC_Y1		
5	GND		
6	GND		
7	KP_ROW0	Keypad	
8	KP_ROW1		
9	KP_ROW2		
10	KP_ROW3		
11	KP_COL0		
12	KP_COL1		
13	KP_COL2		
14	KP_COL3		
15	GND		
16	GND		
17	GPEM_DA1	EIMF	
18	GPEM_DA0		
19	GPEM_DA3		
20	GPEM_DA2		
21	GPEM_DA5		
22	GPEM_DA4		
23	GPEM_DA7		
24	GPEM_DA6		
25	GPEM_DA9		
26	GPEM_DA8		
27	GPEM_DA11		
28	GPEM_DA10		
29	GPEM_DA13		
30	GPEM_DA12		
31	GPEM_DA15		
32	GPEM_DA14		



# Generic Q7 Carrier Card Hardware User Guide

33	GND		
34	GND		
35	GPEM_RW	EIMF	
36	GPEM_CS0		
37	GPEM_BCLK		
38	GPEM_CRE		
39	GPEM_EB1		
40	GPEM_WAIT		
41	SSI_RXD	SSI	3V3
42	GPEM_EB0	EIMF	
43	SSI_TXFS	SSI	3V3
44	SSI_TXD		
45	SSI_TXC		
46	GND		
47	GND		
48	CSI2_D13	Camera	3V3/2V75
49	CSI2_D12		
50	CSI2_D15		
51	CSI2_D14		
52	CSI2_D17		
53	CSI2_D16		
54	CSI2_D18		
55	CSI2_D19		
56	CSI2_HSYNC		
57	CSI2_VSYNC		
58	CSI2_PIXCLK		
59	GND		
60	GND		
61	IOUTF	Analog Video Output	
62	VGA_TV_RED		
63	GPIF_P2		
64	GND		
65	IOUTE	Analog Video Output	
66	VGA_TV_GRN		
67	GPIF_P4	GPIO	
68	GND		
69	IOUTD	Analog Video Output	

70	VGA_TV_BLU		
71	GPIF_P6		
72	GND		
73	GPIF_P7		
74	VGA_HSYNC	Analog Video Output	
75	RFOUT	RF TV Output	
76	VGA_VSYNC	Analog Video Output	
77	GND		
78	GND		
79	CSI2_D11	Camera	
80	CSI2_D10		

**Figure 63: Expansion Connector2 Pin Out**

**Note-1:** The mating connector part number on Qseven CPU Module is: DF17(2.0)-80DP-0.5V(57), Carrier card connector part number: DF17(3.0)-80DS-0.5V(57). The expansion connectors are physically located on top of the carrier board and bottom side in the Qseven module.

**Note-2:** This signals assignments in the expansion connector are specific to iWave Q7 modules and the exact features supported in this expansion connectors will vary based on the Q7 module populated. For more details, please contact iWave.

### 2.23 Power Supply

The Q7 Generic Carrier Card has 12V power jack for external power supply input and uses on board voltage regulators for internal power management.

**Table 7: Power Sequence Table**

Regulators	Voltage	Sequence
VCC_12V	12V	Always power
VCC_5VA	5V	Always power, generated from VCC_12V
VCC_5V	5V	This rail enable after VCC_5VA reaches power good
VCC_3V3A	3.3V	Always power, generated from VCC_12V
VCC_3V3	3.3V	This rail enable after VCC_3V3A reaches power good
VCC_1V8	1.8V	This rail enable after VCC_5V reaches power good
VCC_2V8_CAM	2.8V	This rail enable after VCC_5V reaches power good

#### 2.23.1 Power Jack

A 2.5mm x 6.5mm barrel connector is used which should fit standard DC Plugs with an inner dimension of 2.5mm and an outer dimension of 5.5mm, and it is placed on top of board. If an alternate power supply is used (not the original, supplied power supply), it should supply no more than 12V output. If a Power Supply is properly connected to the Q7 Generic Carrier Card, and the four Red 5V, 5VA, 3V3A, 3V3 power LED indicator is not lit, it could mean that either the fuse has been blown, or that the voltage output of the power supply is too high.

12V power from an external power supply is connected to the Q7 Generic Carrier Card at connector J3. From the connector, the 12V supply is sent directly to a 5A over current protection fuse (F1). Reverse polarity protection is provided using Schottky diode B560C-13-F (D14) and for over voltage protection Zener diode DFLZ12-7 (D15) is used. The circuit is shown below in Figure.

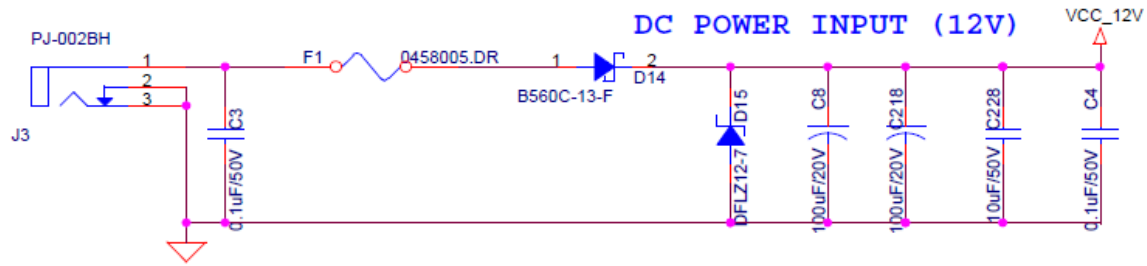


Figure 64: Power In Circuit



Power Jack (J3)

Figure 65: Power Jack

Pin No	Pin Detail	Description
1	12V	Positive Terminal
2	Ground	Negative Terminal
3	Ground	Negative Terminal

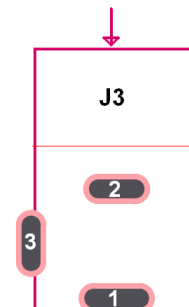


Figure 66: Power Jack Pin Out

## 3. MECHANICAL DETAILS

Q7 Generic Carrier PCB for factor is Nano-ITX- 120 × 120 mm (4.7 × 4.7 in), the overall dimensions of the Q7 Generic Carrier PCB is shown in below Figure.

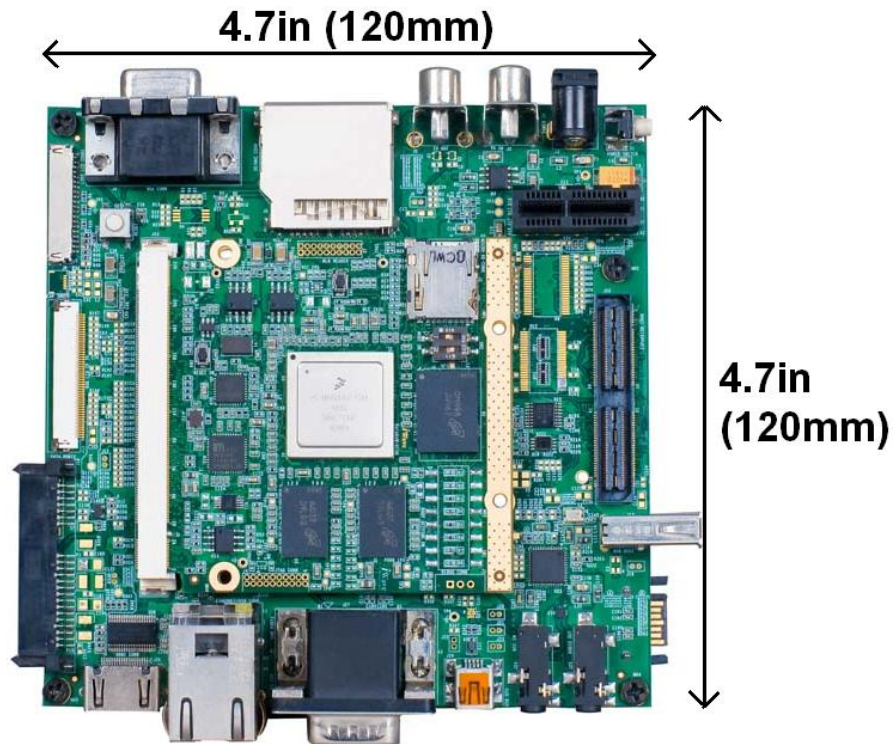


Figure 67: Q7 Generic Carrier Card PCB Dimension



## 4. REFERENCE

### Document Reference

- Qseven-Spec\_1.20.pdf
- Qseven-DG\_10\_Release\_Candidate.pdf

### Related Products:

- Rainbow-G15M-Q7 (i.Mx6x Q7 CPU Module): <http://www.iwavesystems.com/?q=node/239>
- Rainbow G12M-Q7 (AM389x Q7 Module): <http://www.iwavesystems.com/?q=node/134>
- Rainbow G8M-Q7 (i.Mx51 Q7 CPU Module): <http://www.iwavesystems.com/?q=node/138>
- Rainbow G6M-Q7 (Atom Q7 Module): <http://www.iwavesystems.com/?q=node/133>

### 5. TECHNICAL SUPPORT

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